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ABSTRACT

This instructor's guide contains the materials required to teach a competency-based introductory course in concrete finishing to students who have chosen to explore careers in construction. The following topics are covered in the course's three instructional units: concrete materials, concrete tools, and applied skills. Each unit contains some or all of the following: objective sheets, suggested activities, supplemental information/activities to be presented at the instructor's discretion, information sheets, sheets of supplementary information to assist students in solving problems, transparency masters, instructional supplements containing suggestions for teaching basic skills, assignment sheets, job sheets, practical tests, written tests, and answers to assignment sheets and tests. Academic skills training is combined with vocational training throughout the instructional materials, and a system of icons has been used to help instructors identify activities into which training in the following basic skill areas has been infused: reading, science, creative thinking/problem solving, writing, oral communication, employability, math, interpersonal skills, and social studies. Most units of instruction are designed for use in more than one lesson or class period of instruction. These materials precede the instructional units: information on basic skills in curriculum, information on measuring student performance gains, and required criteria for a competency-based education program. A competency profile and basic skills matrix are provided. (MN)

ED 385 683

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introduction to construction series

introduction to concrete finishing

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Introduction To Concrete Finish

Developed as a Cooperative Project by
the Associated General Contractors of America
William W. Brown, Chairman, Manpower and Training Committee
and
Curriculum and Instructional Materials Center,
Oklahoma Department of Vocational and Technical Education

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Curriculum and Instructional Materials Center

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Introduction To Concrete Finish

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FOREWORD

In 1985, The Associated General Contractors of America (AGC) met with representatives of the Oklahoma Curriculum and Instructional Materials Center (CIMC) to discuss the possibilities of developing, as a cooperative project a course of instruction designed for training individuals who choose to seriously explore careers in construction.

This revised publication is the result of those original discussions and updates made through close coordination among general contractors and vocational educators. This series represents conscious effort to coordinate the practical experience of personnel in the construction industry with the best instructional methods of those in the field of vocational education.

Although this book reflects a systematic approach to instructional materials development and the latest in educational technology innovations, the information in the Introduction To Concrete Finish manual should be adapted and modified to coincide with local conditions.

Roy Peters, Jr.
State Director
Oklahoma Department of Vocational
and Technical Education

William. W. Brown, Chairman
Manpower and Training Committee
The Associated General Contractors
of America

PREFACE

Construction requires that students have many skills and related information to become productive workers in this challenging field. Workers must be better trained and equipped to find and retain meaningful employment.

Instructional materials in this manual is written in terms of student performance, using measurable behavioral learning process. Criterion-referenced evaluation instrument provide for a uniform measurement of student progress.

The purpose of this manual is to assist instructors in all construction related areas in providing instruction throughout the industry. Any information in this manual that does not concur with the instructor's course of study should be modified to meet personal needs.

Personnel safety is of prime concern, as an instructor you are encouraged to closely observe and couch students in all safety issues. We have done much to advise students of possible dangers, but your close supervision and alertness can't be overemphasized.

Al Willey
Curriculum and Instructional
Materials Center
Oklahoma Department of Vocational
and Technical Education

ACKNOWLEDGEMENTS

Much appreciation is expressed to the many individuals who contributed their time, talents, and knowledge in the revision of this manual.

Thank you to the following ad hoc committee members, AGC staff representatives, and the staff of the Oklahoma Department of Vocational and Technical Education.

John Friedemann
CIMC Coordinator
Stillwater, OK

William W. Brown, Chairman
Manpower and Training Committee
The Associated General Contractors
of America

AGC Committee Members

Robert Siess
Tarlton Corporation
St. Louis, MO

E.A. Proefke
Dunedin, FL

Ralph E. Eggleston
Jaynes Corporation
Albuquerque, NM

John Heffner
AGC - Manpower and Training Services
Washington, DC

Edward J. Hynds, Jr.
English Brothers Co. Inc.
Champaign, IL

Len Toenjes
Construction Training School
St. Louis, MO

Fernando Samarron
H.B. Zachry Co.
San Antonio, TX

Preston Leckie
Flintco Inc.
San Antonio, TX

Mike Lambert
Lambert Construction
Stillwater, OK

Oklahoma Committee Members

Larry Downey
Downey Construction
Edmond, OK

Greg McCrocklin
Manhattan Construction Co.
Tulsa, OK

Ken Russell
Ken Russell Co.
Tulsa, OK

Oklahoma Department of Vocational and Technical Education Staff

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Al Willey
Instructional Development Specialist
CIMC - Oklahoma Department of Vocational and Technical Education

USE OF THIS PUBLICATION
INSTRUCTIONAL UNIT

Introduction to Concrete Finish contains three units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the instructor, extensions and options, information sheets, students supplements, transparency masters, instructional supplements, assignment sheets, job sheets, practical tests, written test, and answers to assignment sheets and written test, all of which are included in the instructor's edition. The student workbook includes the objective sheets, information sheets, student supplements, transparency masters, assignment sheets, and job sheets. Written tests may be duplicated for classroom use or *additional copies* may be purchased by calling 1-800-654-4502 or, in Oklahoma, 1-800-522-5810, ext. 589.

All of the unit components tie into measurable and observable learning outcomes. Instructors are encouraged to supplement these components with other resources in order to make them as responsive to local conditions and individual needs as possible.

Most units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
  - Supplies and equipment needed
  - Amount of class time needed for demonstrations
  - Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet (White Pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms. The unit objectives states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective could be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion-referenced test items.

Suggested Activities (Pink Pages) – **Instructor's Edition only**

The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities prior to introducing the unit to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Extensions and Options (White Pages) – **Instructor's Edition only**

Extensions and Options are supplemental material that is not testable or graded and is nice-to-know. Extensions and Options provide the instructor with additional activities, fact sheets, art, controversial items, and extra practice sheets. They may also include items for the gifted or remedial student. Extensions and Options are used at the discretion of the instructor.

Information Sheets (Green Pages)

The information sheet provides "must know" content essential for meeting the cognitive objectives stated at the beginning of each unit. It serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective.

Students should read the information sheet before it is discussed in class. Space is provided in margins for students and instructors to add notes that clarify and/or expand on the information provided.

The information sheet may include notes, cautions, or warnings. These should be discussed carefully and thoroughly. **Notes** are short verbal additions to the information sheet or procedural outline that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. **Cautions** are advisories that tell the student how to avoid causing minor personal injury or equipment damage. **Warnings** are advisories to the student used to avoid serious personal injury or death to the student, persons in the workplace, or users of the project or the procedure.

Student Supplement (Green Pages)

Student supplements include instructions that could be used for solving problems or reinforcing the enrichment of learning. The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment or job sheets. While supplements are not tested over directly, they may be used to assist in meeting the performance objectives.

Transparency Masters (White Pages) - **Instructor's Edition only**

Transparency masters provide information in a special way. The students may see as well as hear the materials being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information or assignment sheets.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Instructional Supplements (Pink Pages) — **Instructor's Edition only**

Instructional Supplements provide suggestions for teaching the basic skills included in each assignment sheet or job sheet. They are located directly in front of the components they support–assignment or job sheets–in each unit.

Assignment Sheets (Tan Pages)

Assignment sheets provide students with information and exercises that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit component for such information.

Assignment Sheet Answers (Pink Pages) – **Instructor's Edition only**

This component is designed to assist the instructor in evaluating student performance on assignment sheets.

Job Sheet (Blue Pages)

Job Sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlined in each job sheet. Furthermore, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or salon situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests (Yellow Pages) – **Instructor's Edition only**

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet. The check-off list allows instructors to evaluate a student's process performance of the task on the job sheet. The overall competency indicator allows the instructor to evaluate the end product.

Written Test (Yellow Pages) – **Instructor's Edition only**

This component provides criterion-referenced evaluation of every objective listed in the unit of instruction. If objectives have been added, deleted, or modified, appropriate changes should be made on the test.

In order to measure and document student competency gains as required by the latest Carl Perkins regulations, and as outlined in the Oklahoma-developed system of standards and measures, it is *absolutely essential* that the same test be used as a pretest and as a posttest. If you choose to use tests other than the ones included herein, be sure that the same instrument is used for each activity–pre- and post test.

A detailed explanation of the Oklahoma plan for standards and measures and the Carl Perkins requirements is included in the CIMC publication, *Measuring Learning & Competency Gain: The Pretest/Posttest Approach.* This booklet and accompanying software designed to assist in calculating and recording student gains are available to all vocational teachers through the school's vocational testing liaison.

To further assist vocational teachers, the CIMC is in the process of developing test code sheets for each written test in its more recent publications, including this one. These code sheets are explained in Section 8 of the publication mentioned above, and will greatly assist in verifying that the test is a valid instrument for measuring student learning and competency gains. As the test code sheets for programs become available, they will be forwarded to teachers of each program; further publications will include the test code sheets.

Written Test Answers (Pink Pages) – **Instructor's Edition only**

This component is designed to assist the instructor in evaluating student performance on written tests.

COMPETENCY PROFILES

A competency profile is included in the front of this publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. ***Introduction to Concrete Finish*** has not been abbreviated. Each unit will be recognized by the unit number in Arabic numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since some CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in Introduction to Concrete Finish, which is unit 2, would look like this:

OBJECTIVE SHEET - **Introduction to Concrete Finish**
CIMC - A2 - 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Coordinator of Development
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

For a free catalog, a list of new publications, or other instructional materials information call 1-800-522-5810, extension 589.

RESALE

BASIC SKILLS IN CURRICULUM

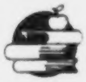
The CIMC has always been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

Recent state and federal legislation mandates vigorous basic skills development in vocational education in the wake of demands by industry that workers *must* be academically, as well as technically, competent, given the nature of the highly complex work place. In response, the CIMC has taken the following steps to document that, indeed, the instructional materials *do* combine academic skills training with the vocational training. In addition, concerted efforts have been made to "beef up," or enhance the basic skills instruction already present. Following is a brief description of those processes:

Basic Skills Icons and Enablers

To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, and a list of specific tasks, or enablers, to identify the basic skill or skills that are called for in each job or assignment sheet.

Each of the nine broad skills areas—reading, writing, mathematics, science, oral communication, interpersonal or relating, creative thinking and problem solving, employability, and social studies—is represented by the icon presented below.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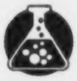
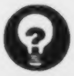
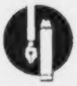
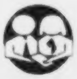
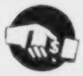
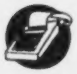

Science

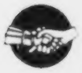

Creative Thinking/
Problem Solving

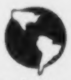

Writing


Oral Communication


Employability


Math


Interpersonal or Relating


Social Studies

When an activity involving one of these basic skills is identified, the corresponding icon is placed in the left-hand margin of the job or assignment sheet. The basic skills training is further defined by retrieving the specific, or enabling, skill that is required by consulting a list of over two hundred and fifty enablers that has been compiled and grouped with each general basic skill. This enabling skill is placed directly below the icon.

As an example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and reference skills. The basic skills that the exercise promotes would be depicted in the left-hand margin as follows:

ASSIGNMENT SHEET

PLANNING LIVING SPACE FOR HUMAN NEEDS

1

Name ______________________________ Score __________

OBJECTIVE 10 **Define personal territory.**

INSTRUCTIONS

Reading Comprehension
- Gain factual information

Functional Reading
- Follow written instructions
- Use content area vocabulary

Language
- Use standard grammar, spelling, and capitalization
- State ideas clearly

- As discussed in Objective 1, each person has an invisible "space bubble" or comfort zone. A comfort zone is the space between oneself and others that brings a feeling of well-being. When one's comfort zone is crowded or invaded, discomfort often results. Therefore, personal territory needs should be a prime consideration when planning living space.
- For each of the following situations, draw your estimated comfort zone around the figures provided.
- Indicate how many inches from your body the comfort zone extends.
- Consider how that comfort zone changes in different situations. Answer the questions that follow.

Basic Skills Documentation Matrix

Another component of the CIMC basic skills instructional plan is the "Basic Skills Documentation Matrix." The matrix graphically summarizes the basic skills training included in the vocational program, unit by unit. It should be helpful to teachers in planning their instruction, and to administrators as documentation that basic skills **are** being addressed during the vocational training.

The matrix for this publication is included as an 8½" by 11" foldout in this *Instructor's Manual.*

Matrices have been developed for most CIMC publications. For more information on those available for other programs, call the CIMC at 1-800-654-4502.

Instructional Supplement

The supplement is a tool for the instructor to use in helping students apply the basic skills in Assignment Sheets and Job Sheets. Some supplements are appropriate for use with all students; some are for use only with those students who do not understand the academic skills called for in the exercise.

MEASURING STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single Written Test. This test should be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. Detailed information regarding performance gains analysis is contained in the CIMC publication, *Measuring Learning & Competency Gains: The Pretest/Posttest Approach.* In addition, the CIMC has developed a computer program, CARL, which will perform all necessary calculations and will print out a record form of all information required for gain score analysis. Copies of CARL and the publication are available through your local testing liaison (in Oklahoma), or from the CIMC at 1-800-654-4502.

REQUIRED CRITERIA FOR A COMPETENCY-BASED EDUCATION PROGRAM

Criterion	Discussion	CIMC component meeting criterion
1. Instruction is based on clearly-stated learning objectives that are: a) observable and measurable, and b) communicated in writing to students before instruction begins.	Learning objectives drive CBE. Objectives are the "competencies" that learners must achieve. Each objective must clearly state what *learners* must *do* to demonstrate acquired skill or knowledge. Verbs in learning objectives are active and precise, stating the exact performance expected of learners. The objectives should also specify the standard or level of performance required. Objectives can be at any level of Bloom's Taxonomy and can include the cognitive, psychomotor, and affective domains. Higher-order cognitive skills should be included.	Objective Sheet
2. Instruction is aligned with the stated learning objectives	In CBE, the objectives specify what is taught. "Content" should relate to one or more objectives. The curriculum should cover all objectives with relevant information.	Information Sheet
3. There is a student evaluation system that is: a) criterion-referenced, and b) aligned to the learning objectives and the curriculum.	In CBE, the aim is to bring the performance of *all* learners up to a pre-defined standards and competencies. Learners work on each competency until they achieve "mastery"; the evaluation system should test and record this mastery. Learners can restudy and retest as often as needed. Specific remediation activities should also be available to learners when needed. The evaluation system focuses on what each student has achieved, not on what the instructor has "taught." The "constant" in CBE is student performance; the "variables" are time and resources. (This differs from traditional systems where learners get one chance at mastery; some succeed and some fail. In such systems, time and resources are constant and student achievement is variable.) If an evaluation is criterion-referenced, successful learner performance is defined by (or *referenced* to) mastery of pre-set objectives and standards (or *criteria*): there must be a careful match (or *alignment*) between what the student should master (objectives), what is taught (curriculum), and what is tested. Objectives, curriculum, and evaluation system must all match.	Written Test and Job Sheet/Skill Test

Criterion	Discussion	CIMC component meeting criterion
4. There is an observable management system of cognitive skill practice that provides for, promotes, and documents mastery learning.	For both cognitive and psychomotor skills, a CBE program must have a system of maintaining records of which skills and activities each learner has completed, which ones are in progress, and which ones have not yet been completed. Completion means "mastery"; no skill is completed until the learner has achieved the mastery level. The record system should promote feedback on student skill attainment to *both* instructor and learners, provide for remediation as needed, and encourage reevaluation of learner performance until mastery is achieved. Appropriate remediation strategies often should consider learning styles and other individual differences among learners. Learners should work on skills and activities until they achieve mastery. They should not be "passed on" without mastery. While learners may move ahead and work on other skills (i.e those for which all prerequisite skills have been mastered or those without prerequisites), work should also continue on the skills still requiring mastery. Students should not attempt higher-order skills until all prerequisite skills are mastered.	Assignment Sheet
5. There is an observable management system of psychomotor skill practice that provides for, promotes, and documents mastery learning.		Job Sheet/Skill Test
6. Skill mastery records are maintained for each learner, and learners have access to and make use of these records to monitor their skill acquisition.	Records should clearly indicate the skills each learner has mastered. One such record should profile or list the competencies that have been mastered and those to be mastered. Other performance indicators can be added and kept in a portfolio for each learner. Learners should have ready access to their portfolios to monitor their own progress in skill mastery and competency attainment.	Competency Profile

CORRECTIONS AND SUGGESTIONS

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2 Fold downward

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OKLAHOMA DEPARTMENT OF
VOCATIONAL AND TECHNICAL EDUCATION/CIMC
1500 W. 7TH AVE
STILLWATER OK 74074-9907

26

OBJECTIVE SHEET

CONCRETE MATERIALS

A 1

INTRODUCTION

This unit deals with basic terms, materials, and safety guidelines for working with concrete.

Pouring and finishing concrete requires unique skills and knowledge. It becomes very costly when concrete work is done incorrectly and has to be redone.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to recognize and state uses of concrete materials. The student will demonstrate these competencies by completing the assignment sheet, job sheets, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with concrete materials, match them to their correct definitions.
2. Given a list of alternatives, discriminate between proper and improper concrete safety guidelines.
3. From a list, choose proper characteristics of concrete.
4. Provided a representative drawing, identify types of concrete joints.
5. Select the correct alternative of statements about the types and uses of concrete reinforcement.
6. From alternatives, choose the proper action to prevent common concrete failures.
7. Choose the correct response to factors that affect the curing of concrete.

8. Calculate the cubic yards needed to pour a structure. (Assignment Sheet)

9. Perform a concrete slump test. (Job Sheet)

SUGGESTED ACTIVITIES

CONCRETE MATERIALS A 1

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Give an overview of the course, explaining the organization of the materials.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with concrete materials, match them to their correct definitions.

- Review the definitions of *concrete* and *cement*. Emphasize that cement is an ingredient in concrete.
- Discuss the term *aggregate*. Emphasize the economic reasons for using filler material to provide volume by stating that aggregates account for 60 to 80 percent of the volume of concrete.
- Show the film *The Foundation*. Point out the various materials as the film progresses.

Objective 2: Given a list of alternatives, discriminate between proper and improper concrete safety guidelines.

- Review the safety rules for proper dress when working with concrete. Stress that fresh concrete is highly alkaline and can cause skin irritation, eye infection, and severe skin burns.

Objective 3: From a list, choose proper characteristics of concrete.

- Explain that cement is the key ingredient of concrete and that concrete is probably the most widely used building material in the world.

- Display samples and discuss the various types of raw materials that are used in making portland cement, such as limestone, marlde, marl, oyster shells, waste sludge from lime plants, clay, shale, bauxite, silica sand, iron ore, waste from aluminum plants,and slag from blast furnaces.

Objective 4: Provided a representative drawing, identify types of concrete joints.

- Use the Information Sheets and Transparencies 1 through 3 to show various types of concrete joints.

Objective 5: Select the correct alternative of statements about the types and uses of concrete reinforcement.

- Use the Information Sheets and Transparencies 4 and 5 to show various concrete reinforcement types.
- Emphasize the tensile strength added to concrete by using reinforcement.

Objective 6: From alternatives, choose the proper action to prevent common concrete failures.

- Emphasize the need for properly planning for concrete pours.
- Discuss experiences you may be aware of when improper action was taken.

Objective 7: Choose the correct response to factors that affect the curing of concrete.

- Discuss the safety issues in using uncured concrete structures and their lack of load bearing capability.

APPLICATION

Objective 8: Calculate the cubic yards needed to pour a structure. (Assignment Sheet)

- Describe the concrete calculator briefly.
- Have students complete the Assignment Sheet.

Objective 9: Perform a concrete slump test. (Job Sheet 1)

- Assign students to complete the Job Sheet.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

The Foundation

NOTE: This film illustrates the step-by-step procedure for building a concrete basement and includes a section on pouring footings. It is available on a free-loan basis to Oklahoma teachers, who may order from the Oklahoma Department of Vocational and Technical Education, 1500 West Seventh Avenue, Stillwater, OK 74074. Out-of-state teachers may order from Circle Oak Productions, 73 Girdle Ridge Drive, Katonah, NY 10536.

UNIT REFERENCES

- Toenjes, Leonard P. *Building Trades Dictionary*, American Technical Publishers, Inc.: Homewood, IL 60430.
- White, George. *Concrete Technology*. Delmar Publishers, Inc.: 2 Computer Drive West, Albany, NY 12212.
- Willey, Al. *Commercial Carpentry*. Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America: Stillwater, OK, 1993.

INFORMATION SHEET

CONCRETE MATERIALS A 1

OBJECTIVE 1

Given a list of terms associated with concrete materials, match them to their correct definitions.

- **admixture** — agent added to concrete mix immediately before or during mixing to alter one or more concrete characteristic

  EXAMPLE: Pigments are mixed with concrete to change its color.

- **aggregate** — granular material which makes up about 60 to 80 percent of the volume of concrete.

  NOTE: Sand, gravel, and crushed stone are the most commonly used aggregates.

- **air entrainment** — entrapment of small air pockets in concrete; they help concrete resist the adverse effects of the freeze/thaw cycle.
- **anchor** — metal device used to fasten structural members to concrete or masonry
- **bond** — to cause to stick together
- **bleeding** — emergence of mixing water on the surface of newly placed concrete; caused by settling of solid materials within the mass
- **cement** — powder made from alumina, silica, lime, iron oxide, and magnesia burned together in a kiln and finely pulverized; an ingredient in concrete
- **concrete** — building material made by mixing cement, water, and aggregates

  NOTE: Fresh concrete is highly alkaline (caustic) and can cause skin irritation, eye infection, and in some cases severe skin burns. Always wear protective clothing and follow strict safety precautions when working with fresh concrete.

- **curing** — the process of hardening concrete
- **dermatitis** — a skin infection that can be caused by exposure to cement
- **form** — a structure or mold used to retain concrete until it hardens
- **hydration** — chemical reaction of water with cement resulting in hardening
- **joint** — seam used to control and/or prevent the amount of cracking in concrete or to allow movement of adjoining concrete masses
- **keyway** — a groove built into concrete structures to improve their ability to shift or move horizontally without cracking or overlapping
- **pigment** — admixture added to concrete to change its color
- **plasticity** — capacity for being flexible or workable
- **reinforcement** — steel bars, fibers and/or fabrics added to concrete to increase its strength
- **retarding admixture** — an agent added to concrete to slow the curing process; used in hot weather to improve concrete strength
- **setting time** — time required for concrete to become firm or solid
- **slump test** — test used to determine the consistency of concrete
- **slump** — measure of consistency of freshly mixed concrete
- **workability** — ease with which concrete can be placed, consolidated, and finished

OBJECTIVE 2

Given a list of alternatives, discriminate between proper and improper concrete safety guidelines.

INTRODUCTION

There is a safety concern when working with concrete: cement dermatitis or cement poisoning.

- Cement dermatitis

  For persons frequently working with concrete, cement is a major cause of skin irritation. When wet, the lime contained in cement causes it to heat and burn the skin. Prolonged exposure and inhalation could result in sores appearing on the skin and/or in the lining of the mouth and nose.

  This condition is called cement poisoning or cement dermatitis, and these factors contribute to its formation:

  — Excessive sweating

  — Failure to observe precautions

  — A pre-existing dermatitis or allergy

  There are several precautions that can reduce your risk to cement dermatitis. They are:

  — Use of goggles

  — Use of face mask

  — Frequent washing

  — Bathing after each shift

  — Use of rubber gloves/boots

  — Use of a lanolin-based soap or lotion

  Medical care should be sought for those who develop cement dermatitis.

OBJECTIVE 3 **From a list, choose proper characteristics of concrete.**

INTRODUCTION Concrete characteristics include its composition and the makeup of common types.

- Concrete composition is cement, aggregates, and admixtures.
  - Raw materials used in cement
    - Lime
    - Silica
    - Alumina
    - Iron ore
    - Gypsum
  - Added ingredients to form concrete
    - Aggregates such as gravel or sand make up 60-80% of concrete.
    - Admixture substances (optional)
- Common types and uses of cement
  - Type I — Normal portland cement; general purpose
  - Type II — Modified portland cement for moderate sulfate resistance, lower heat of hydration; generally used for massive construction
  - Type III — High-early-strength portland cement; used when high strength at an early age is desired
  - Type IV — Low-heat portland cement; used where rate of heat must be kept at a minimum, necessary only in massive construction

- Type V — Sulfate-resistant portland cement; used only in construction that is exposed to severe sulfate action

- White portland cement — Pure white-colored cement, generally used for architectural purposes.

  NOTE: There are several other types of cement that are used for special projects.

OBJECTIVE 4

Provided a representative drawing, identify types of concrete joints.

INTRODUCTION

Concrete joints are designed to:

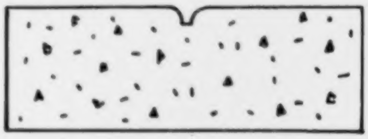
a. control concrete cracking

b. allow for movement of building components

c. add to the decorative element of concrete

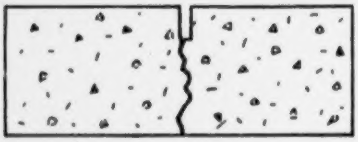
- Control joints

FIGURE 1



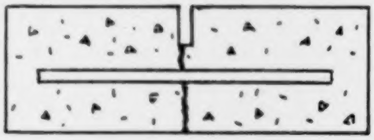
Tooled Dummy Joint

FIGURE 2



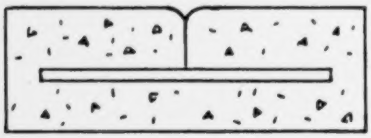
Sawed Control Joint

FIGURE 3



Sawed Control Joint
(W/ smooth steel dowel)

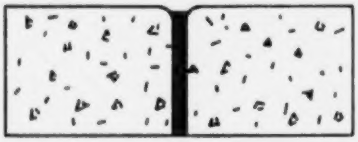
FIGURE 4



Tooled Control Joint
(W/ smooth steel dowel)

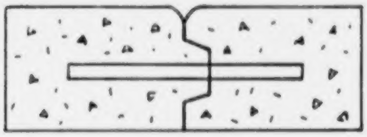
- Construction joints

FIGURE 5



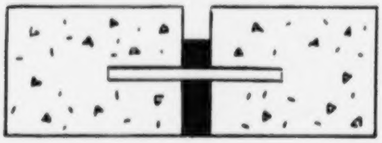
Tooled Construction Joint
(W/ expansion material)

FIGURE 6



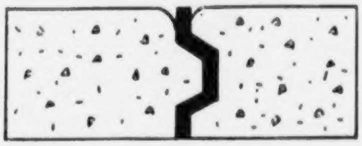
Tooled Construction Joint
(W/ keyway)

FIGURE 7



Construction Joint
(W/ steel dowel and slip cap)

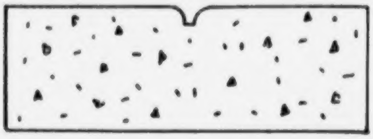
FIGURE 8



Tooled Construction Joint
(W/ keyed expansion)

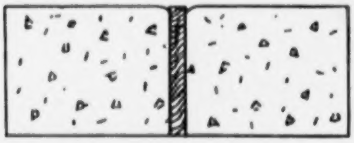
- Decorative joints

FIGURE 9



Tooled Dummy Joint

FIGURE 10



Decorative Joint
(W/ wood spacer)

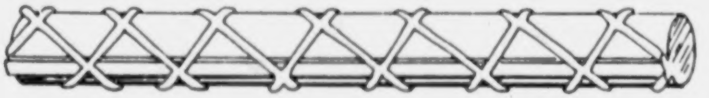
OBJECTIVE 5 **Select the correct alternative of statements about the types and uses of concrete reinforcement.**

INTRODUCTION Concrete alone has limited load bearing strength. By adding reinforcement, the strength can be greatly increased and the uses of concrete expanded in bridges, high-rise buildings, and load-bearing foundations and footings.

- Reinforcing bars (Rebar)

  Steel bars have deformed surfaces to increase their adhesion to concrete. The purpose of rebar is to add to the strength of concrete. (Figure 11)

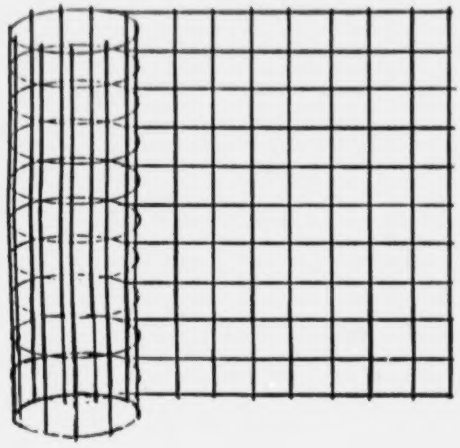
FIGURE 11



- Wire mesh

  Welded wire fabric is used as a grid in concrete to increase the strength of a structure. It is available in various layouts and sizes. (Figure 12)

FIGURE 12



- Fiber mesh

  Fiber mesh is made up of short strands of materials such as glass, nylon, polyethylene, and steel. The fibers are mixed with the concrete to add strength.

OBJECTIVE 6 **From alternatives, choose the proper action to prevent common concrete failures.**

INTRODUCTION Concrete fails in several ways including cracking, wearing, and corroding.

- Cracking

  - Weather related cracking

    Concrete that is exposed to weather often cracks due to temperature changes and the forces of the freeze/thaw cycles. When water is allowed to freeze and expand within joints or cavities of concrete, it may cause the concrete to crack.

    Weather related cracking can be reduced and controlled by:

    - adding admixtures
    - using joint control
    - using the correct aggregates
    - using the correct water-cement ratio
    - controlling the curing process
    - water repellent coatings
    - smaller joint spacing

- Stress related cracking

  Stress refers to the strength or load bearing capabilities of concrete.

  Stress related cracking can be reduced by:

  - adding reinforcement
  - using the correct aggregates
  - controlling the curing process
  - using the correct water-cement ratio
  - using the correct type of cement
  - using admixtures

- Proper structural design can reduce all types of concrete cracking.

- Wearing

  - Wearing is caused by abrasive action such as that of water, wind, vehicle traffic, and foot traffic.

    Wearing can be reduced by:

    - using the right aggregate
    - using the correct cement type
    - using the correct water-cement ratio
    - controlling the curing process
    - using proper finishing procedures

OBJECTIVE 7

Choose the correct response to factors that affect the curing of concrete.

INTRODUCTION

The curing of concrete is necessary and proper curing can greatly add to the durability and strength of concrete.

- Weather
    - Temperature

        The greatest influence on the curing rate of concrete is the temperature. In general, the critical time in the curing process is the first three to seven days. Higher temperatures speed the curing process.

        Hydration, the hardening process, does best when the temperatures are between 55° to 73° F. When the temperatures are above 73°, the hydration should be slowed to gain the greatest strength of the concrete.

        Slowing the hydration process can be done by:

        - adding admixtures
        - wetting the surface with water
        - using a curing agent or compound on the concrete surface
        - keeping the concrete surface covered (curing blanket)

        When concrete temperatures fall below freezing, no hydration takes place, and without heating, concrete could be permanently damaged.

    - Humidity

        In arid building sites, special care must be taken to ensure moist curing of the concrete.

- Water-cement ratio

  Too much or too little water can result in poor quality concrete. The proper water-cement ratio aids the hydration process and increases concrete's strength and resistance to freezing and wear.

  A worker should never add water to ready-mix concrete without consulting his or her supervisor. Severe structural damage can result from the weakened concrete.

- Summary

  Proper hydration of concrete increases its durability and strength. Hydration can be aided when concrete moisture is lost slowly over several days.

OBJECTIVE 8 **Calculate the cubic yards needed to pour a structure.** (Assignment Sheet)

- Procedure for calculating cubic yards of concrete.

  1. Determine the size of the concrete structure to be poured.
  2. Use the following formula using the width (W), the length (L), and the thickness (T) or height (H) of the structure.

$$\text{Cubic yards of concrete} = \frac{\text{width in feet} \times \text{length in feet} \times \text{thickness in feet}}{27}$$

  For example, a 4-inch thick floor for a 40 × 60-foot building requires:

$$\frac{40 \times 60 \times .33}{27} = 29.3 \text{ cu. yd. of concrete}$$

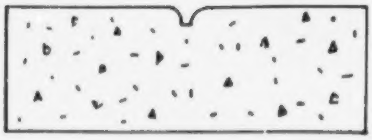
  3. Notice the thickness must be expressed as a decimal of a foot. The following table provides you the decimal equivalent of thickness. (Table)

Table: Decimal Equivalent

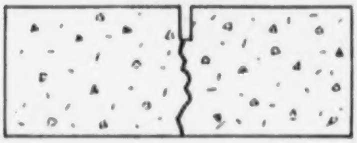
Inches	Decimal Part of Foot
4	0.33
5	0.42
6	0.50
7	0.58
8	0.67
9	0.75
10	0.83
12	1.00

OBJECTIVE 9 **Complete the Job Sheet.**

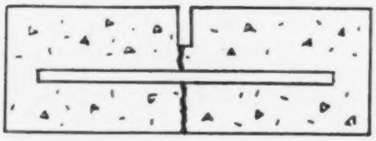
Types of Joints
(Control Joints)



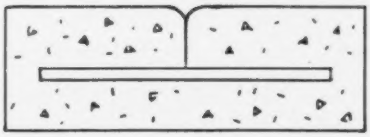
Tooled dummy joint



Sawed control joint

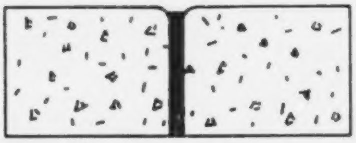


Sawed control joint
(W/ smooth steel dowel)

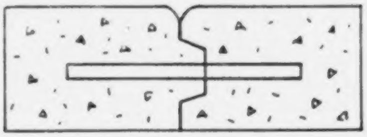


Tooled control joint
(W/ smooth steel
dowel)

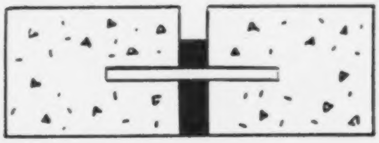
Types of Joints
(Continued)
(Construction Joints)



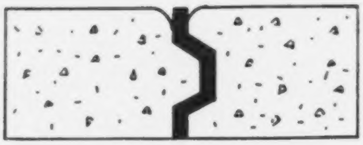
Tooled construction joint
(W/ expansion material)



Tooled construction joint
(W/ keyway)

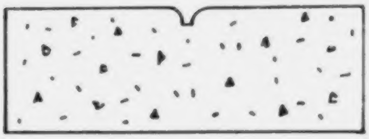


Construction joint
(W/ Steel dowel and
slip cap)

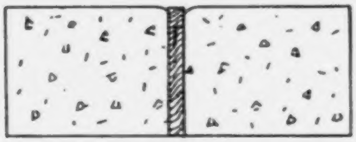


Tooled Construction
Joint
(W/ keyed expansion)

Types of Joints
(Continued)
(Decorative Joints)



Tooled dummy joint



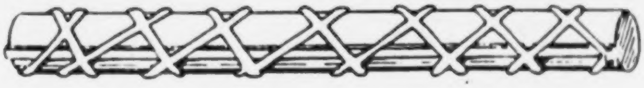
Decorative joint
(W/ wood spacer)

47

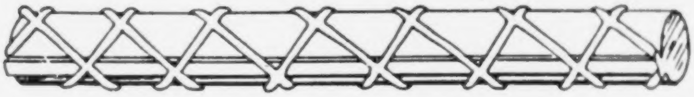
votech

Sizes of Reinforcing Bars

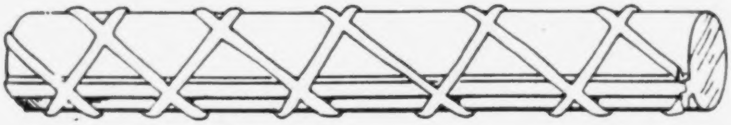
#3 = 3/8 inch



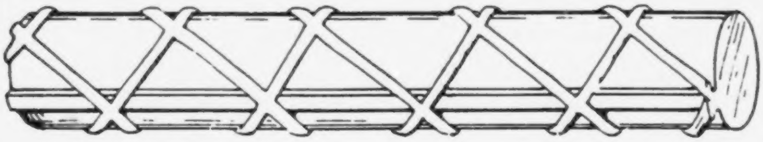
#4 = 1/2 inch



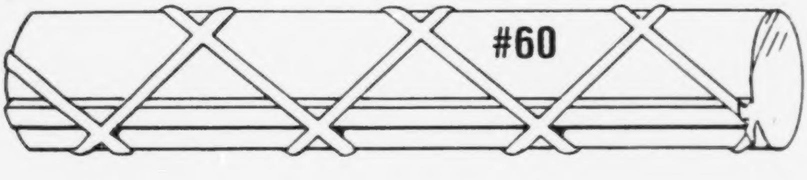
#5 = 5/8 inch



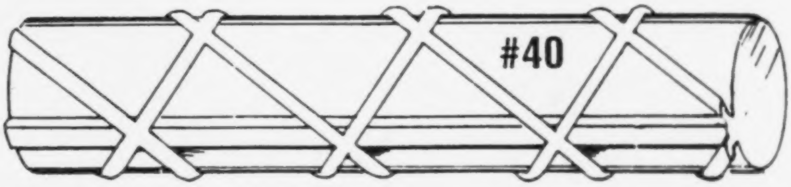
#6 = 3/4 inch



#7 = 7/8 inch

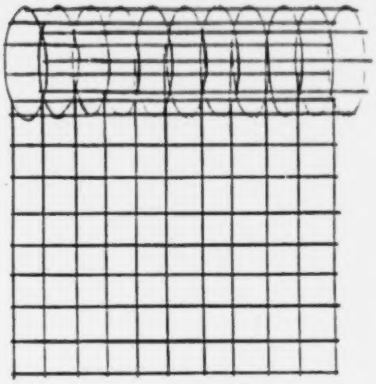


#8 = 1 inch

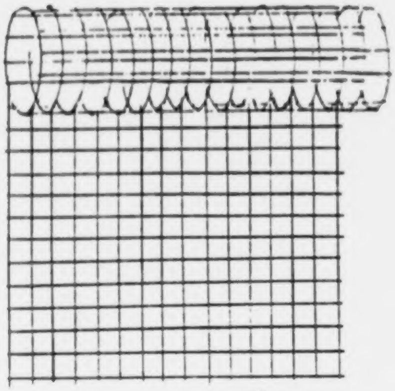


NOTE: Those shown are the most common, many other sizes are available. The size of the bars can be found by multiplying their number by $\frac{1}{8}$″ (#4 = $\frac{4}{8}$ or $\frac{1}{2}$)

Standard Sizes of Welded Wire Mesh

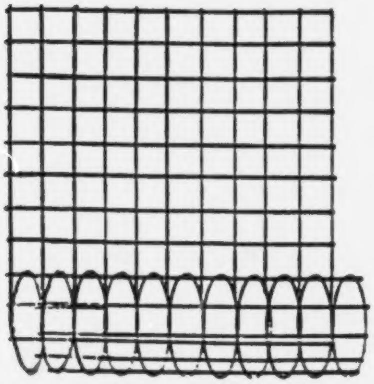


6 × 6 — W2.0 × W2.0

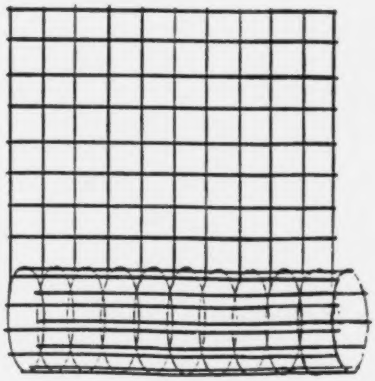


4 × 4 — W1.4 × W1.4

6 × 6 — W2.9 × W2.9



6 × 6 — W1.4 × W1.4



ASSIGNMENT SHEET

CONCRETE MATERIALS

A 1

Name ______________________________ Score __________

OBJECTIVE 8

Calculate the cubic yards needed to pour a structure.

INTRODUCTION

Use the Assignment Sheet to practice calculating the concrete needed to pour various sizes of structures.

INSTRUCTIONS

Functional Reading Skills
- Follow written instructions

Operation and Calculation Skills
- Round off numbers

Math Application Skills
- Solve word problems
- Select/apply mathematical formula

Calculate the amount of concrete needed to pour the following size structures. Round your answer to the next highest cubic yard.

1. A slab 40 ′(W) × 60′(L) × 6″(T)

   ____

2. A wall 30′(L) × 4′(H) × 12″(T)

   ____

3. A footing 120′(L) × 4′(H) × 8″ (T)

   ____

4. A slab 26′(W) × 19′(L) × 8″(T)

   ____

5. A wall 39′(L) × 6′(H) × 9″(T)

   ____

6. A footing 200′(L) × 3′(H) × 10″(T)

   ____

NOTE:

L = length

H = height

T = thickness

W = width

CONCRETE MATERIALS

A 1

ASSIGNMENT SHEET

Rounded to the next highest yard

1. 45
2. 5
3. 12
4. 13
5. 7
6. 19

JOB SHEET

CONCRETE MATERIALS A 1

OBJECTIVE 9

Perform a concrete slump test.

INTRODUCTION

A concrete slump test is used to determine its flowability. Concrete must conform to the building plan specifications.

TOOLS AND EQUIPMENT

- Rubber gloves and goggles
- Wheelbarrow
- Slump cone mold
- Bullet-nosed steel rod (smooth), ⅝" by 24"
- Scoop or trowel
- Folding rule or steel tape
- Concrete
- Water in container

PROCEDURE

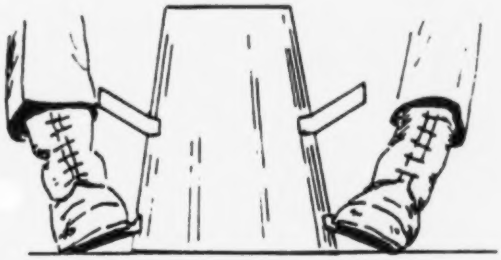
Yes No

1. Put on safety equipment. ___ ___
2. Collect concrete in wheelbarrow. ___ ___
3. Dampen slump cone mold with water. ___ ___
4. Place slump cone mold on firm, level, clean, nonabsorbent surface. ___ ___
5. Stand on the foot pieces of cone mold to hold it firmly in place. (Figure 13) ___ ___

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

FIGURE 13



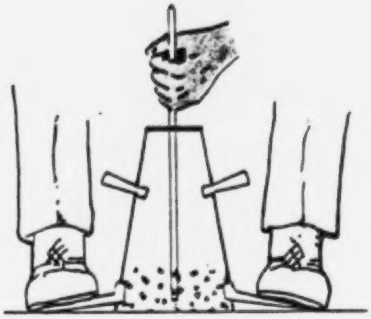
General Science Skills
- Use scientific instruments

Physical Science Skills
- Investigate forms/changes of matter

Job Acquisition/Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
6. Fill one-third of cone mold with concrete. (Figure 14)	___	___

FIGURE 14

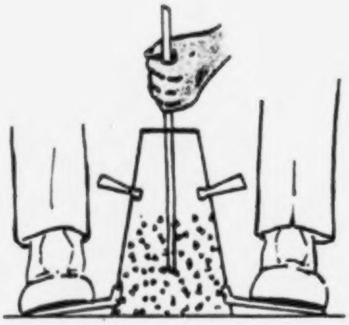


	Yes	No
7. Rod with up and down motion twenty-five times, using steel rod.	___	___

NOTE: Always distribute rodding strokes evenly by starting at outer edge and moving in a spiral toward center.

	Yes	No
8. Fill two-thirds of cone mold with concrete. (Figure 15)	___	___

FIGURE 15

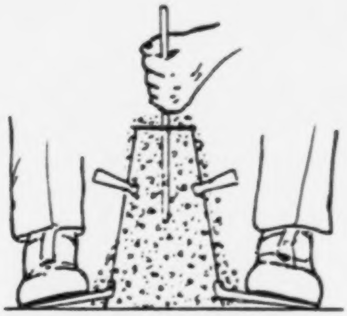


Yes No

9. Rod twenty-five times, barely penetrating into first layer. ___ ___

10. Fill cone mold to overflowing with concrete. (Figure 16) ___ ___

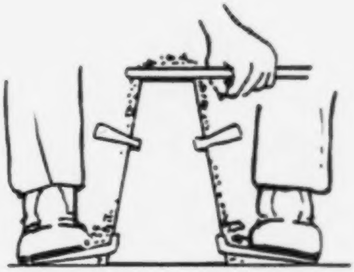
FIGURE 16



11. Again rod twenty-five times, taking same precautions about depth and distribution of strokes. ___ ___

12. Level top of cone with steel rod so that cone mold is level full. (Figure 17) ___ ___

FIGURE 17



Yes No

13. Clean excess concrete away from base of cone mold. ___ ___

14. Immediately raise cone mold, taking only five to ten seconds to perform this operation. ___ ___

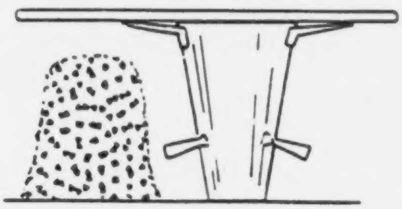
IMPORTANT: Perform this operation with a steady upward lift. Do not shake mold in any way or disturb the sample.

---

15. Place cone mold next to sample upside down, taking caution not to disturb the sample. ___ ___

16. Place steel rod horizontally across mold so that it extends over the sample. (Figure 18) ___ ___

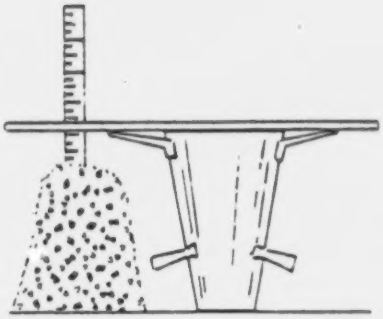
FIGURE 18



17. Measure distance from bottom of steel rod to the point of the original center of sample. (Figure 19) ___ ___

Yes No

FIGURE 19



18. Put away equipment and supplies and clean work area. ___ ___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

___

___

___

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Proper use of safety equipment	4	3	2	1
Dampened slump cone with water	4	3	2	1
Filled cone with ⅓ concrete	4	3	2	1
Proper number of rodding strokes	4	3	2	1
Level top of cone	4	3	2	1
Proper lifting of mold	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

WRITTEN TEST

CONCRETE MATERIALS

A 1

Name ______________________________ Score ________

OBJECTIVE 1

Given a list of terms associated with concrete materials, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. A substance added to concrete to change its color is called a/an

a. admixture resin
b. cubold
c. pigment
d. dye bar

_____ 2. What is the name of an agent added to concrete to slow the curing process?

a. Aggregate
b. Hydration agent
c. Pigment
d. Retarding admixture

_____ 3. Which devices are used to fasten structural members to concrete or masonry?

a. Cubolds
b. Anchors
c. Bind straps
d. Aggregates

_____ 4. The granular material used in concrete is called

a. aggregate
b. fill
c. slump
d. cement

May be photocopied for student use.

_____ 5. A structure or mold used to retain concrete until it hardens is called a/an

a. joint
b. anchor mold
c. form
d. slump bed

_____ 6. Entraping air pockets in concrete is called

a. hydration
b. pigmentation
c. bubble heating
d. air entrainment

_____ 7. What is the chemical reaction of water with cement resulting in hardening?

a. Bonding
b. Hydration
c. Permeability
d. Dermatitis bonding

_____ 8. A groove built into concrete structures to improve their ability to shift or move horizontally without cracking or overlapping is called a

a. plasticity joint
b. keyway
c. Pozzolan
d. cuboid groove

_____ 9. A skin irritation that can be caused by exposure to cement is known as

a. lime abrasion
b. Pozzolan
c. cement dermatitis
d. cement aggregate

May be photocopied for student use

_____10. What is the term used to describe the ease with which concrete can be placed, consolidated, and finished?

a. Workability
b. Permeability
c. Hydration
d. Slump

_____11. A powder made of alumina, silica, lime, iron oxide, and magnesia burned together and finely pulverized is known as

a. aggregate
b. concrete
c. admixture
d. cement

OBJECTIVE 2 **Given a list of alternatives, discriminate between proper and improper concrete safety guidelines.**

_____ 1. To reduce your risk of cement dermatitis

a. wash frequently
b. wear rubber gloves
c. wear rubber boots
d. all the above

_____ 2. How can feet best be protected from being injured when pouring concrete?

a. Wear hard-toed boots
b. Wear rubber boots
c. Wear tennis shoes
d. Wet your boots before pouring begins

May be photocopied for student use.

OBJECTIVE 3 **From a list, choose proper characteristics of concrete.**

_____ 1. Which of the following best defines the composition of concrete?

a. Cement
b. Aggregates (gravel and sand)
c. Admixtures
d. Cement, aggregates, and admixtures

_____ 2. Which of the following materials is used in cement?

a. Lime
b. Gravel
c. Aggregates
d. Sand

_____ 3. Which best describes Type 1 cement?

a. High early strength cement
b. Normal portland—general purpose cement
c. Low-heat portland cement
d. Pure white-colored cement

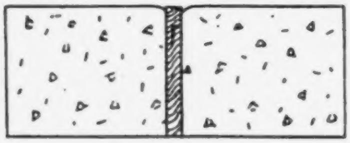
_____ 4. The major characteristic of Type V cement is

a. pure white-colored
b. high-early strength
c. sulfate-resistant
d. low-heat

May be photocopied for student use.

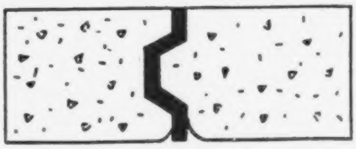
OBJECTIVE 4 **Provided a representative drawing, identify types of concrete joints.**

_____ 1. The figure shown below represents a



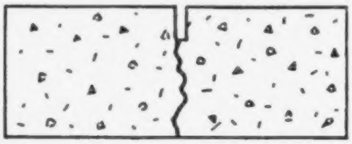
a. decorative joint with wood spacer
b. tooled dummy joint
c. construction joint with spacer
d. tooled construction joint

_____ 2. The concrete joint shown below is a



a. construction joint with dowel
b. tooled expansion joint
c. sawed control joint
d. tooled construction joint with keyed expansion

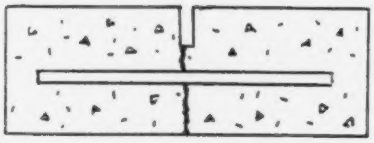
_____ 3. The drawing shown below is a



a. tooled dummy joint
b. tooled construction joint
c. sawed control joint
d. construction joint with dowel

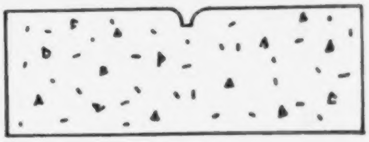
May be photocopied for student use.

_____ 4. The joint represented in the drawing below can best be described as a



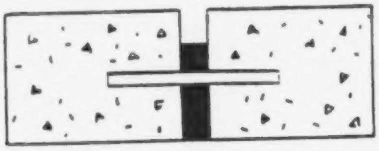
a. decorative joint with dowel
b. sawed control joint with dowel
c. tooled control joint with dowel
d. tooled dummy joint

_____ 5. The figure below represents a



a. sawed control joint
b. tooled dummy joint
c. tooled control joint
d. tooled control joint with dowel

_____ 6. The concrete joint shown below represents a



a. tooled dummy joint with dowel
b. sawed control joint
c. construction joint with steel dowel and slip cap
d. construction joint with dowel and filler bar

May be photocopied for student use.

OBJECTIVE 5

Select the correct alternative of statements about the types and uses of concrete reinforcement.

_____ 1. Steel bars that are used within concrete to increase its strength are called

- a. fabric
- b. Rebar
- c. keyways
- d. fiber

_____ 2. Welded wire fabric that forms a grid within concrete and increases its strength is called

- a. Rebar
- b. wire mesh
- c. cross-wires
- d. fiber mesh

_____ 3. Short strands of steel added to concrete to increase its strength are called

- a. fiber mesh
- b. wire mesh
- c. Rebar
- d. fiber injections

_____ 4. Concrete reinforcement expands the uses of concrete to structures such as

- a. bridges
- b. high-rise buildings
- c. load bearing foundations/footings
- d. all the above

May be photocopied for student use.

OBJECTIVE 6

From alternatives, choose the proper action to prevent common concrete failures.

_____ 1. What action can be taken to reduce and control weather related cracking of concrete?

a. Use joint control measures
b. Remove admixtures
c. Use no aggregates
d. Reduce the amount of Rebars

_____ 2. Which of the following actions reduces cracking that may be caused by the freeze/thaw cycle?

a. Use water repellent coating
b. Eliminate admixtures
c. Increase the speed of curing
d. Do not use joint control measures

_____ 3. How can the abrasive action of vehicle traffic over concrete be reduced?

a. Using softer aggregates
b. Increasing the water content
c. Using joint control measures
d. Controlling the curing process

_____ 4. How can cracking related to concrete stressing be reduced?

a. Increasing the water in the mixture
b. Adding reinforcement
c. Removing admixtures
d. Removing all aggregates

OBJECTIVE 7

Choose the correct response to factors that affect the curing of concrete.

_____ 1. What factor(s) affect the curing of concrete?

a. Weather
b. Water-cement ratio
c. Admixtures
d. All the above

May be photocopied for student use.

_____ 2. Which of the following temperatures provide the greatest aid to the hydration process?

a. 0° — 32°F
b. 16° — 46°F
c. 55° — 73°F
d. 90° — 100°F

_____ 3. What can be done in hot weather to slow the hydration process?

a. Reduce the water ratio
b. Cover the surface with a curing blanket
c. Remove all admixtures
d. Expose the concrete surface to sunlight

_____ 4. Which of the following factors *could* result in permanently damaging the concrete?

a. Allowing the concrete to freeze
b. Using a curing agent
c. Wetting the concrete surface
d. Trying to heat the concrete during cold weather

_____ 5. Which process is the greatest aid to ensure the maximum concrete strength and durability after hydration?

a. Fast drying in less than two days
b. Freezing the concrete
c. Water must be removed as fast as possible
d. Concrete moisture is lost slowly over several days

OBJECTIVE 8 **Evaluated on the Assignment Sheet.**

OBJECTIVE 9 **Evaluated on the Job Sheet.**

May be photocopied for student use.

WRITTEN TEST ANSWERS

CONCRETE MATERIALS

A 1

OBJECTIVE 1

1. c
2. d
3. b
4. a
5. c
6. d
7. b
8. b
9. c
10. a
11. d

OBJECTIVE 2

1. d
2. b

OBJECTIVE 3

1. d
2. a
3. b
4. c

OBJECTIVE 4

1. a
2. d
3. c
4. b
5. b
6. c

OBJECTIVE 5

1. b
2. b
3. a
4. d

OBJECTIVE 6

1. a
2. a
3. d
4. b

OBJECTIVE 7

1. d
2. c
3. b
4. a
5. d

OBJECTIVE 8 Evaluated on the Assignment Sheet.

OBJECTIVE 9 Evaluated on the Job Sheet.

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO CONCRETE FINISH

UNIT NUMBER AND TITLE – A1 – CONCRETE MATERIALS

TOTAL NUMBER OF TEST QUESTIONS 36

TOTAL NUMBER OF BASIC SKILL QUESTIONS 7

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	**1, 3-6, 8-10**	X
1	**2, 7, 11**	S
2	**1-2**	X
3	**1-4**	X
4	**1-6**	X
5	**1-4**	X
6	**1-4**	X
7	**1**	X
7	**2-5**	S
8	**Evaluated on the Assignment Sheet**	
9	**Evaluated on the Job Sheet**	

OBJECTIVE SHEET

CONCRETE TOOLS A 2

INTRODUCTION

Concrete tools must be used effectively and safely. Timing is critical when finishing concrete, and using the proper tools can enhance the speed of placement and improve the quality of the finished product.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student should be able to recognize and safely use concrete tools. the student will demonstrate these competencies by completing the assignment sheet and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to show the ability to:

1. Given a list of terms associated with concrete placement, match them to their correct definitions.
2. Given a list of alternatives, discriminate between proper and improper safety rules for the care and use of tools.
3. Given a statement to describe its intended purpose, state the name of the corresponding concrete hand tool. (Assignment Sheet 1)
4. State the correct concrete power tools when given a statement describing their intended uses. (Assignment Sheet 2)
5. Complete a safety test pertaining to power tools. (Assignment Sheet 3)

CONCRETE TOOLS A 2

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with concrete tools, match them to their correct definitions.

- Use the Information Sheet to discuss the terms associated with concrete tools.
- Explain that there are regional differences in the use of terms. As examples, a jointer may be called a joint rod or a tamper may be referred to as a jitterbug.

Objective 2: Given a list of alternatives, discriminate between proper and improper safety rules for the care and use of tools.

- Use the Information Sheets to describe the safety rules for the care and use of concrete tools.
- Explain the importance of following the manufacturer's instructions when using tools.
- Discuss how safe and proper use of tools will save tools and prevent accidents.
- Have students explain details of accidents they know of when someone used tools improperly.
- Discuss newspaper clippings or case studies that relate to improper use of tools.
- Demonstrate to students how to clean and store tools properly.
- Demonstrate how the quality and quantity of work increases when using sharp tools in good condition compared to using dull tools in poor condition.

- Caution students against mishandling saws, and discuss the damage that can be done to the saws and to the workpiece if the saw is mishandled. Have students consider the expense of repairing or replacing tools.

APPLICATION

Objective 3: Given a statement to describe its intended purpose, state the name of the corresponding concrete hand tool. (Assignment Sheet 1)

- Provide actual samples or use tool catalogs to show tools.

- Discuss their general uses, and then demonstrate their uses.

- During demonstrations, give the students any pertinent information they may need to know about specific tools.

  EXAMPLES: Explain how the different grit sizes on rubbing stones will produce a different texture on the surface of the concrete. Caution students about premature rubbing of the concrete because if the concrete has not set long enough, the stone will loosen and pull out the surface aggregate and the protective surface of the concrete.

- Display selected tools from all the sections of the Information Sheet and label each with a letter of the alphabet. Have each of the students see how many of the tools they are able to identify and explain how to use.

- Have students complete Assignment Sheet 1.

Objective 4: State the correct concrete power tools when given a statement describing their intended use. (Assignment Sheet 2)

- Display as many of the concrete power tools illustrated in the Information Sheet as possible.

- Discuss general uses of concrete power tools and discuss the specific uses of each tool.

- Explain that many concrete power tools are heavy and caution students not to strain their backs. Show the video *Back to Basics, Back Injury Prevention.*

- Take a field trip to a construction site where students can watch workers using concrete power tools.

- Assign students to complete Assignment Sheet 2.

Objective 5: Complete a safety test pertaining to power tools. (Assignment Sheet 3)

- Emphasize the need to be certified in the safe use of concrete power tools.

- Show the video *On Your Guard, Power Tool Safety.*

- Assign students to complete Assignment Sheet 3.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements from pretest results.

- Counsel students individually on pretest results and study requirements.

- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.

- Evaluate students on job sheet activities.

- Complete appropriate section of competency profiles.

- Reteach and reevaluate if necessary.

- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

AGC Videos

- *On Your Guard, Power Tools Safety*, AGC of America, Publications Dept., 1957 E. Street N.W., Washington, D.C. 20006.
- *Back to Basics, Back Injury Prevention*, AGC of America, Publications Dept., 1957 E. Street N.W., Washington, D.C. 20006.

UNIT REFERENCES

- Hendrix, Laborn, J. "Bud." *Fundamentals of Concrete and Cement Masonry*. Stillwater, OK: Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America, 1987.
- Toenjes, Leonard P., *Building Trades Dictionary*. American Technical Publishers: Homewood, IL.

- United States Department of the Interior, Bureau of Reclamation. *Concrete Manual: A Water Resources Technical Publication*, 7th ed., Washington, D.C.: U.S. Government Printing Office.
- *Annual Book of ASTM Standards*, Section 4 — Construction, Volume 04.02 Concrete and Mineral Aggregates (newest issue). Printed in Easton, Maryland. American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103. 215-299-5400.
- *Residential Concrete*. Portland Cement Association, 5420 Old Orchard Road, Skokie, IL 60077-4321. 312-966-6200, ext. 450.
- *Modern Carpentry*. Goodheart-Willcox, 123 West Taft Drive, South Holland, IL 60473-2089. 708-333-7200 or 800-323-0440.
- *Annual Book of ASTM Standards*, Section 4 — Construction, Volume 04.42 Concrete and Mineral Aggregates. American Society for Testing and Materials: Easton, MD.

INFORMATION SHEET — CONCRETE TOOLS — A 2

OBJECTIVE 1

Given a list of terms associated with concrete placement, match them to their correct definitions.

- **base** — bottom section of a wall
- **builder's level** — telescope-like instrument used to establish straight lines and determine elevations
- **bullfloats** — a large paddle used on large concrete surfaces to eliminate any high or low spots or ridges left after screeding process
- **control joint** — joint cut in concrete to regulate the location of cracking
- **cove** — concave or radius at bottom section of curb, step, or base
- **crosscut** — to saw wood across or perpendicular to the grain
- **curing compound** — liquid coating applied to newly placed concrete to maintain satisfactory moisture content and temperature in concrete during early setting stages so that desired concrete properties may develop
- **darbies** — tool used to smooth concrete surface to eliminate any high or low spots or ridges left after rodding process
- **decorative joint** — joint cut in concrete for decorative purposes
- **drop chute** — a device used to direct concrete to a specified area and prevent separation of the concrete ingredients when concrete is dropped more than approximately 3 feet
- **ground fault interruption (GFI)** — special circuits used to protect workers from electrical shock when using AC powered tools and equipment

- **edger** — tool used to form a radius at concrete slab edges to improve appearance and reduce risk of damage to edges
- **fin** — projection on formed concrete surface, resulting from mortar flowing into spaces in formwork
- **finishing** — process of working concrete to desired surface texture
- **hand float** — tool used to float concrete around hard-to-reach places and to prepare concrete surface for troweling
- **honeycomb** — void or cavity left in concrete due to ineffective consolidation
- **jointer (groover)** — tool used to create joints (grooves) partly through fresh concrete to act as control of possible cracks and to improve appearance; control joints do not extend completely through the slab and should be at a specified depth
- **leveling rod** — pole with markings graduated upward from zero; used with leveling instrument to determine elevations
- **low-slump concrete** — concrete with a stiff consistency
- **Occupational Safety and Health Act (OSHA)** — federal legislation designed to ensure safe and sanitary work conditions for employees
- **patching** — process of filling form-tie holes, honeycombs, or any other defects in concrete
- **placing** — process of distributing concrete
- **plumb bob** — tool attached to a string; used to set and check the vertical location of a surface
- **power trowel** — a concrete finishing tool that smooths with a series of blades rotated by an electric or gasoline motor
- **ripping** — to saw wood with the grain
- **screeding** — to level concrete to a specific grade

- **square** — to form a right angle; 90 degrees to a straight line

- **straightedges** — tool used to rod concrete surface to a given grade

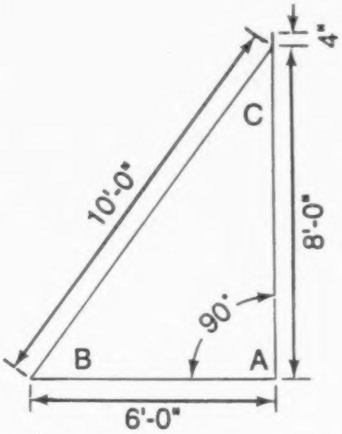
- **super flat floors** — concrete floors that have a high gloss finish and made of high psi concrete (very hard/strong mixture)

- **tamper (tamp)** — tool used on low-slump (1 inch or less) concrete to embed coarse aggregate just below concrete surface and to consolidate concrete surface

- **3-4-5 method** — method of squaring a line by forming a right triangle using largest multiple of 3-4-5 possible for length of lines being squared, and ensuring that longest side of triangle is exact appropriate multiple of 5

  EXAMPLE: Using 3-4-5 method to square building lines 6′-0″ × 8′-0″, line BC will measure exactly 10 feet. (Figure 1)

FIGURE 1



- **trowel** — tool used to give concrete surface a dense, smooth finish

OBJECTIVE 2

Given a list of alternatives, discriminate between proper and improper safety rules for the care and use of tools.

INTRODUCTION

Concrete tools are used to distribute or place concrete and finish the concrete. Using concrete tools for their intended purpose, using them safely, and properly caring for tools is a mark of professional concrete workers. Use OSHA and manufacturer's safety rules and regulations. These are a few examples of rules.

- Rules for care and safe use of hand tools
  - Use the correct tool for the job.
  - Keep tools clean; be sure to wash concrete from surfaces immediately after use.
  - Maintain tools properly.
  - Keep tools sharp when appropriate.
  - Inspect tools frequently to make sure they are in good condition.
  - Repair or replace broken or damaged tools promptly.
  - Dispose of broken tools that cannot be repaired.
  - Do *not* use broken tools.
  - Do *not* throw tools.
  - Protect cutting edge of tools when carrying and storing.
  - Store tools properly when not in use.

    NOTE: *Do not* carry tools in your pocket; *do not* place tools where they can roll off; protect cutting edges; lightly oil tools before storing; store tools in a dry place.
  - Wear eye, ear, and respiratory protection when appropriate.

- Stay alert when using tools.

  EXAMPLE: Keep fingers away from cutting edges; work away from your body when using cutting tools; be sure everyone is clear before you swing a sledgehammer; use tools with insulated or wood handles when working around electrical equipment.

- Safety rules pertaining to power tools

  Power tools may be operated by electricity (AC or DC), air, combustion engines, or explosive powder.

  - *Do not* attempt to operate any power tool without being certified on that particular tool.
  - Always wear appropriate safety equipment and protective clothing for job being done.

    EXAMPLES: Wear safety glasses and tight-fitting clothing that cannot become caught in the moving parts of the tool. Roll up long sleeves, tuck in shirttail, and tie back long hair.

  - *Do not* leave a power tool running unattended.
  - Assume a safe and comfortable position before starting a power tool.
  - *Do not* distract others or let anyone distract you while operating a power tool.
  - Be sure that an electric power tool is properly grounded before using.
  - Be sure that power is *not* connected before performing maintenance or changing accessories.
  - *Do not* use a power tool with guards or safety devices removed.

- Use proper extension cord of sufficient size to service particular electric tool you are using.
- *Do not* operate an electric power tool if your hands or feet are wet.
- Before attempting to use it, be familiar with the correct operation and adjustment of power tool.
- Keep a firm grip on power-float or trowel-machine handle while operating machine.
- Be sure there is proper ventilation before operating gasoline-powered equipment indoors.
- For gasoline-powered tools, use *only* the gasoline type indicated by the tool manufacturer.
- Keep fire extinguishers handy when filling and operating gasoline-powered equipment.

  NOTE: OSHA requires that gasoline-powered equipment be turned off prior to filling with gasoline.
- Lift heavy object with your legs—*not* with your back.
- Keep feet away from cutting tools such as concrete saws, grinders, and trowel-machine blades.

- Guidelines for proper care of power tools
  - Keep tools clean and in good working order.
  - Follow manufacturer's maintenance procedures.
  - Protect cutting edges.
  - Keep tool accessories properly maintained.
  - Report any unusual noises, sounds, or vibrations to the instructor or supervisor.
  - Inspect tools and accessories regularly.

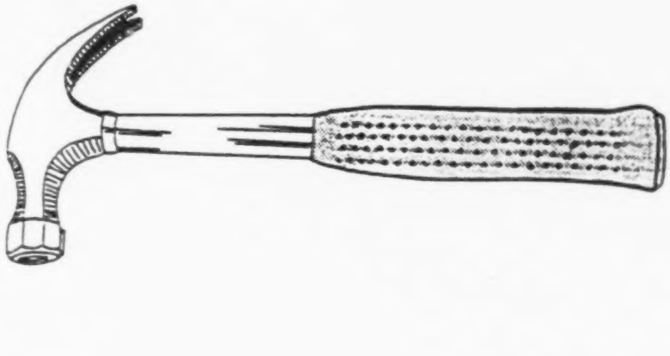
  - Store tools properly when not in use.
  - Clean spraying equipment immediately after each job.
  - Change trowel-machine blades when they become ragged.

- General uses of power tools used for placing and finishing fresh concrete
  - Power straightedges — tool used on various types of jobs to compact concrete, to bring concrete to desired grade and to prepare concrete for finishing procedures
  - Power float machines — tool used on flat concrete to consolidate concrete, to remove slight imperfections, to bring fines to the surface, to open concrete surface so that bleed water can escape, to work dry-shake materials into surface, and sometimes to finish the surface of the concrete
  - Power finishing machines — tool used to finish all types and sizes of concrete slabs

OBJECTIVE 3 **Given a statement to describe its intended purpose, state the name of the corresponding concrete hand tool.** (Assignment Sheet 1)

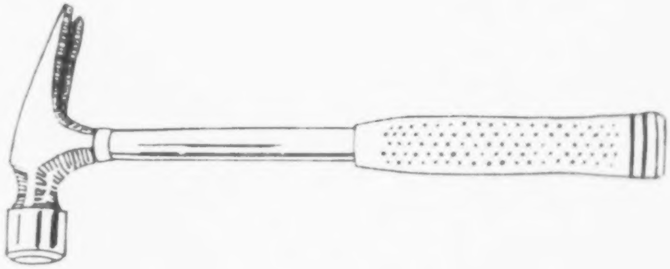
- Hammers
  - Claw hammer — Used to drive and pull nails

FIGURE 2



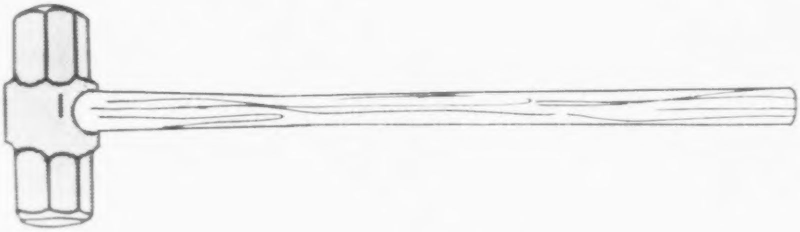
— Straight-claw hammer — Used to drive nails, pull nails, dismantle, and wreck

FIGURE 3



— Sledge hammer — Used to drive stakes and break concrete; sledge hammers used for forming operations weigh from 6 pounds to 12 pounds, depending on the job they are to be used for.

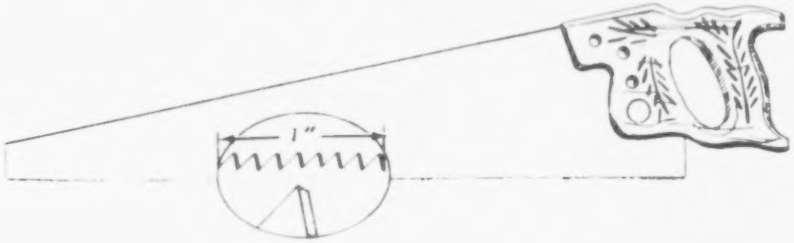
FIGURE 4



- Saws

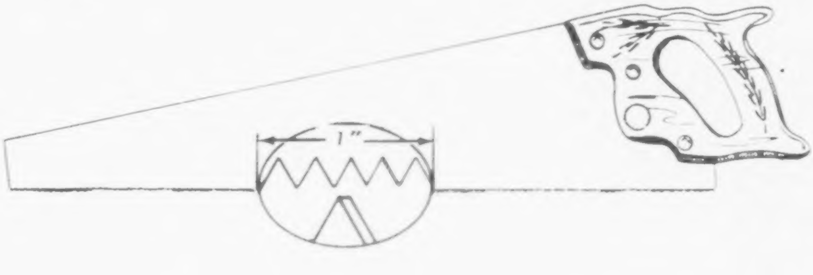
  - Crosscut handsaw — Used to cut across the grain of wood; crosscut saws come in lengths of 20 inches to 26 inches with four to twelve points per inch; teeth are filed at an angle across the face.

FIGURE 5



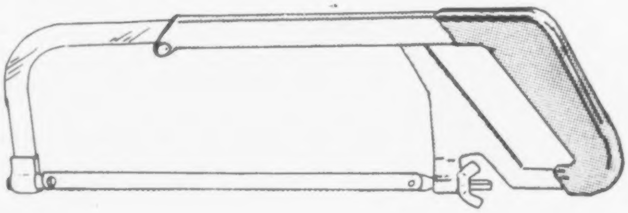
  - Rip handsaw — Used to cut with the grain of wood; ripsaws come in lengths of 20 inches to 28 inches with five to seven points per inch; teeth are filed square across the face.

FIGURE 6



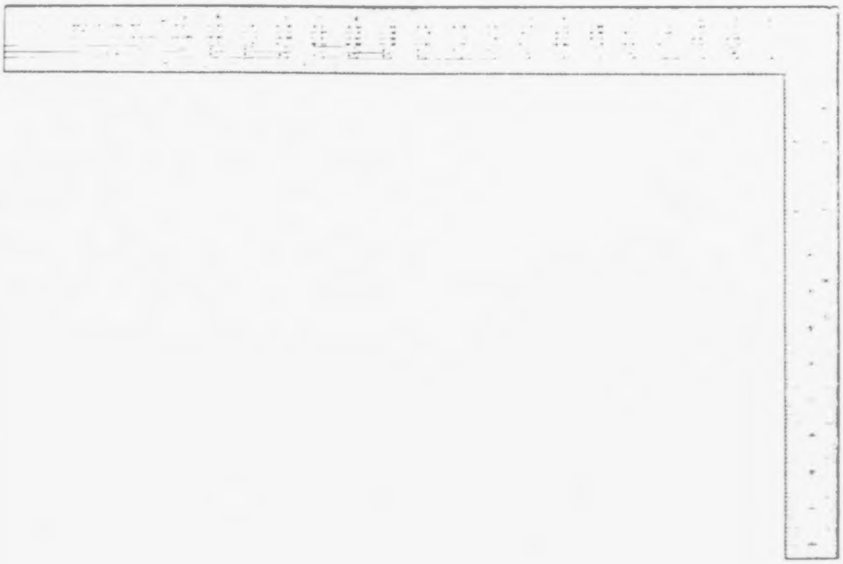
- Hacksaw — Used to cut metal, such as reinforcing bars; hacksaws have U-shaped frames and replaceable blades that come in lengths of 8 inches to 12 inches.

FIGURE 7



- Squares
  - Framing square — Used to square corners, check squareness, and lay out 90-degree angles

FIGURE 8



- Measuring tools

  - Flexible steel tape — Used to measure irregular as well as regular shapes and to make accurate inside and outside measurements; flexible steel tapes slide into a metal case. Most short tapes come in 6-foot to 25-foot lengths; long tapes come in 50-foot to 100-foot lengths. Both types of flexible steel tapes have a hook or loop on the end adjusted to true zero.

FIGURE 9

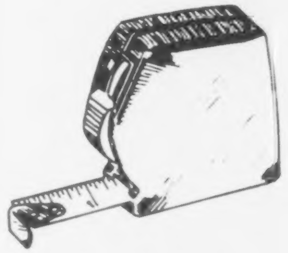
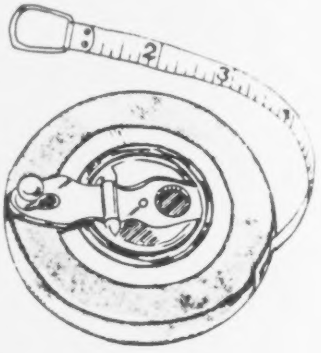
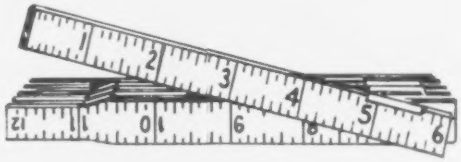


FIGURE 10



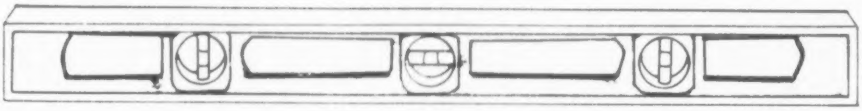
  - Folding rule (zigzag rule) — Used to make accurate inside and outside measurements for laying out forms, laying out joints, and checking for square

FIGURE 11



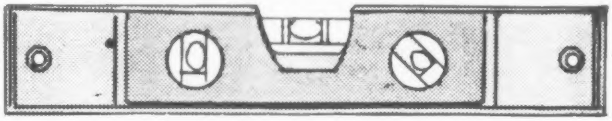
- Leveling instruments
  - Spirit level — Used to level forms and to transfer and check grades

FIGURE 12



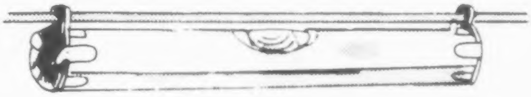
  - Torpedo level — Used to check grades on short forms such as step treads

FIGURE 13



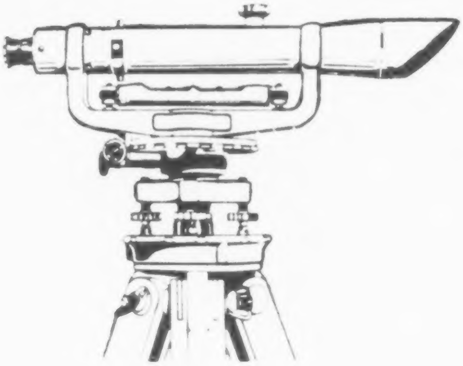
  - Line level — Used to check grades of a dry line

FIGURE 14



- Builder's level — Used to set and check elevations

FIGURE 15

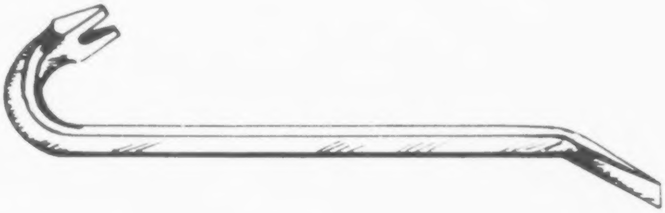


- Miscellaneous tools and equipment
  - Line (string line; dry line) — Used as a guide to set stakes and forms straight and accurately

FIGURE 16

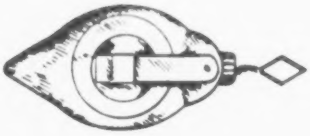
  - Ripping bar (wrecking bar) — Used to pull nails, to pry, and to remove forms

FIGURE 17



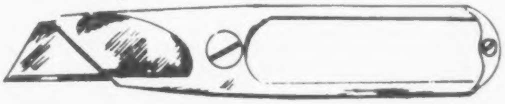
- — Chalk box and line — Used to lay out work on concrete, to lay out cut lines on lumber, and to mark joints in concrete

FIGURE 18



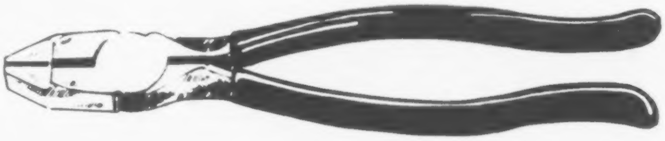
- — Utility knife — Used to cut expansion material

FIGURE 19



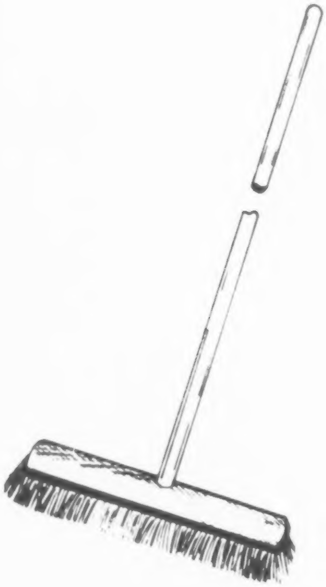
- — Side-cut pliers — Used to cut and twist wires on reinforcing steel and on forms

FIGURE 20



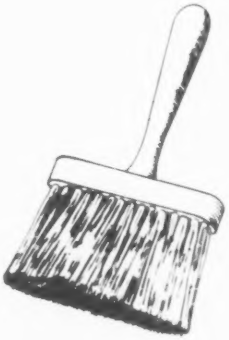
- Push broom — Used to finish fresh concrete and for general clean-up work

FIGURE 21



- Utility brush — Used in finishing and rubbing operations and to clean other tools

FIGURE 22



- Chisels — tools used to cut off projections and to chip off loose or scaled concrete

FIGURE 23

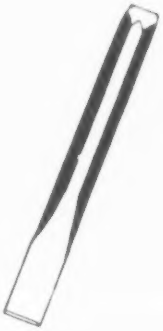


FIGURE 24

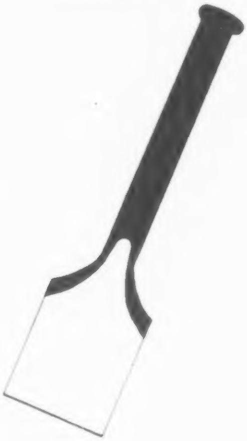
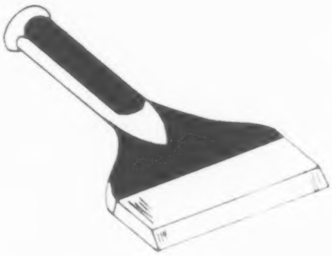
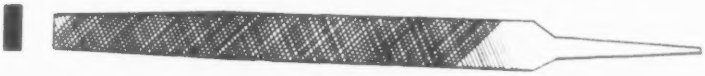


FIGURE 25



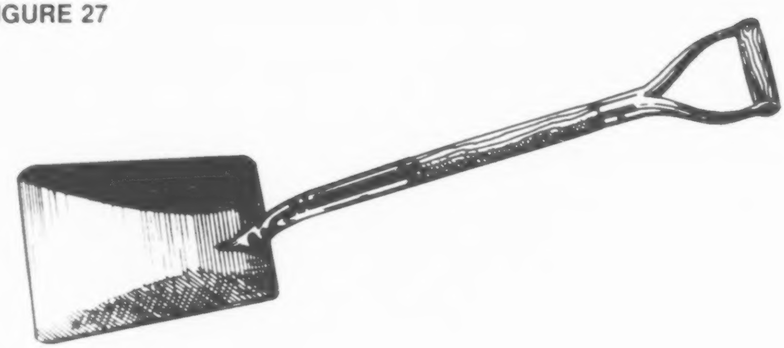
- Flat file — Used to dress edges of trowels and to file off burrs on other tools

FIGURE 26



— Shovel — Used to place concrete

FIGURE 27



- Concrete finishing tools

INTRODUCTION

The common wood or magnesium straightedge is used to screed or level concrete after it has been placed. The common wood straightedge is generally made of 1¼ inch stock. The common magnesium straightedge is usually 1 inch thick and 4½ inches wide. Straightedges come in lengths ranging from 3 to 16 feet, the length used depending on the distance between the edge forms. Both wood and magnesium straightedges can be used on the same types of jobs, but magnesium straightedges work better on some toppings, prevent drag, and are preferred as a guide when cutting joints.

FIGURE 28

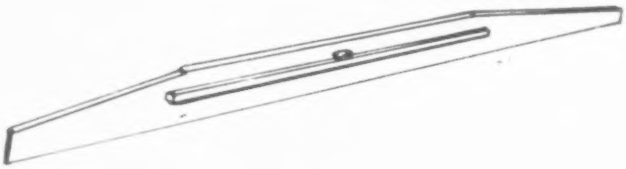
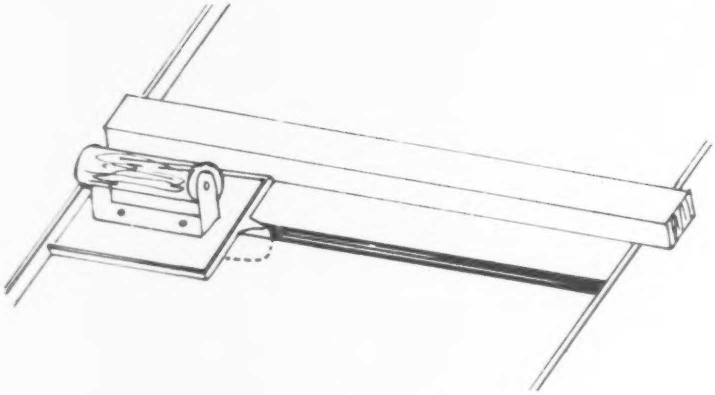


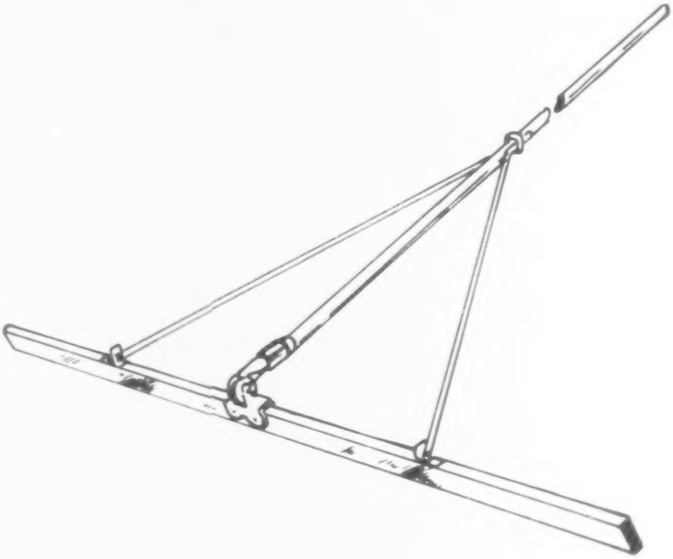
FIGURE 29



- Paver's (highway) straightedge

  The paver's straightedge has a stationary head and a long handle. It is used to check pavement levelness, to cut off high places, and to fill voids.

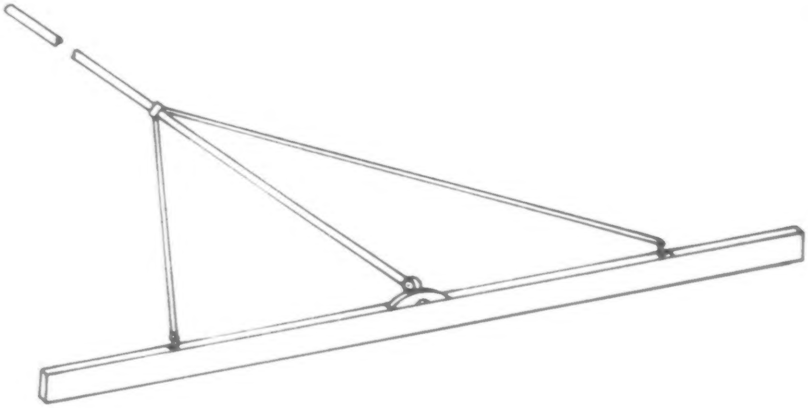
FIGURE 30



— Long-handled, 12-foot, adjustable-head straightedge

The long-handled, 12-foot, adjustable-head straightedge is a heavy straightedge used at right angles to the screeding process to strike off slabs to create super-flat floors.

FIGURE 31



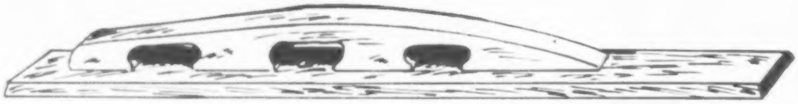
- Darbies

INTRODUCTION

Darbies are long, flat rectangular pieces of wood or magnesium that have handles and come in lengths of from 2½ to 6½ feet and widths from 3 to 4 inches. Magnesium and wood darbies can be used on the same types of jobs, but magnesium darbies are more durable, prevent drag, and are preferred on some types of topping and on air-entrained concrete.

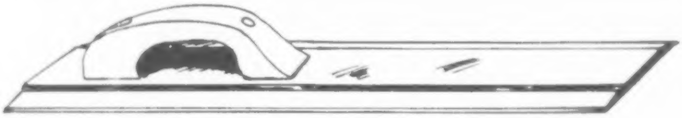
— Wood darby

FIGURE 32



— Small magnesium darby

FIGURE 33



- Bullfloats

INTRODUCTION

Bullfloats serve the same general function as darbies, but they are more commonly used in locations where there is enough room to accommodate their 4- to 18-foot handles. The tool itself is a large, flat, rectangular piece of wood or metal (aluminum or magnesium) that is usually 8 inches wide and ranges in length from 3½ to 5 feet. Both wood and metal bullfloats can be used to bullfloat floor slabs, pavement, and sidewalks made with normal types of concrete, but metal bullfloats prevent drag, are much lighter than wood bullfloats, and are preferred on some toppings, low-slump concrete, and air-entrained concrete.

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- Wood bullfloat
- Metal (magnesium or aluminum) bullfloat

FIGURE 34

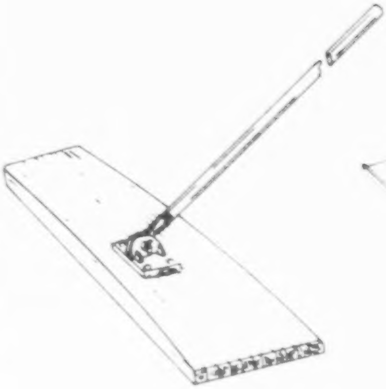
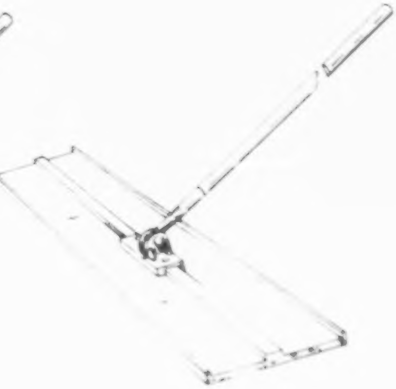


FIGURE 35



- Tampers

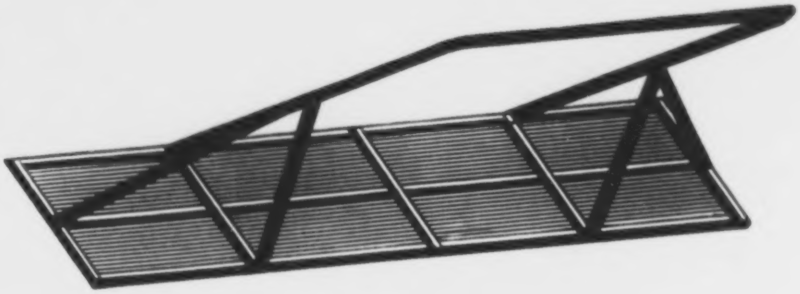
INTRODUCTION

There are three basic types of tampers: the small, flat, hand-held type; the larger 3- to 4-foot jitterbug; and the largest 3- to 6-foot rollerbug. The size of the job determines the size of the tamper used, but all types are used only on low-slump (1 inch or less) concrete or exposed aggregate.

Tampers are used to embed coarse aggregates just below the concrete surface and to consolidate the surface.

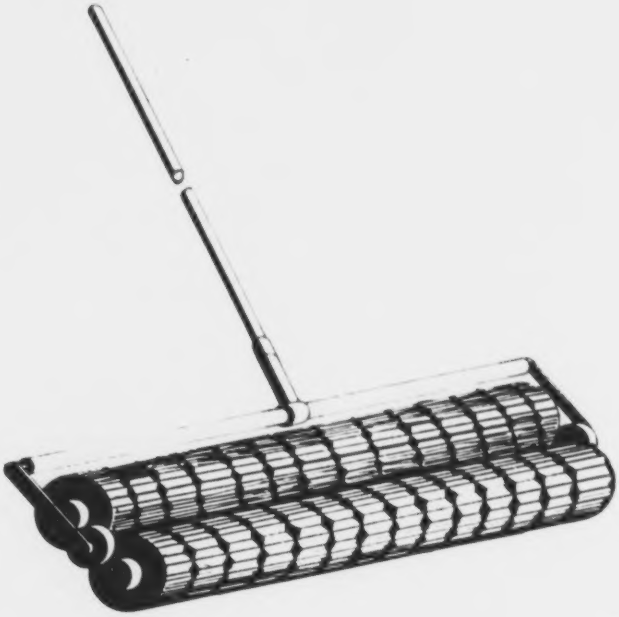
— Jitterbug

FIGURE 36



— Rollerbug

FIGURE 37



- Edgers

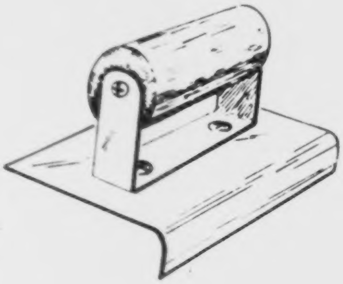
INTRODUCTION

Edgers are made of steel, stainless steel, bronze, or malleable iron. They are available in many sizes, but the most common sizes are those from 6 to 10 inches long, from 1½ to 4 inches wide, and with a lip that is from ⅛ to ⅝ inch and a radius from ⅛ to 1½ inch. Edgers are used to edge sidewalks, floor slabs, driveway approaches, and pavement. Some edgers have a long handle so that they can be used from a standing position.

Edgers improve the appearance of finished concrete and reduces the risk of damage to edges.

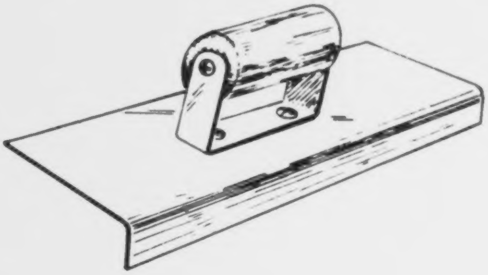
— Sidewalk edger

FIGURE 38



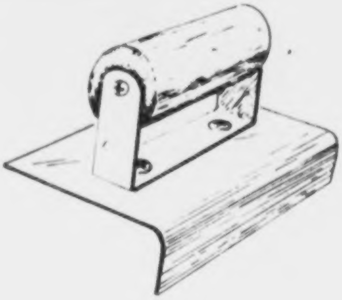
— Pavement edger

FIGURE 39



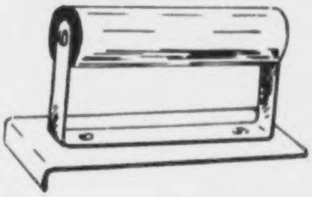
— Curb edger

FIGURE 40



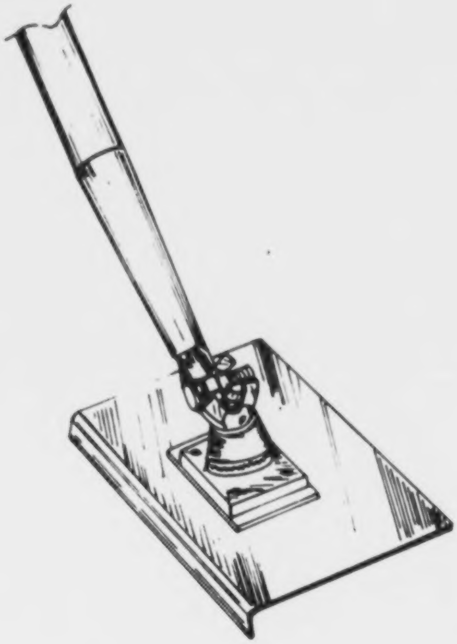
— Radius edger

FIGURE 41



- Long-handled walking-type edger

FIGURE 42



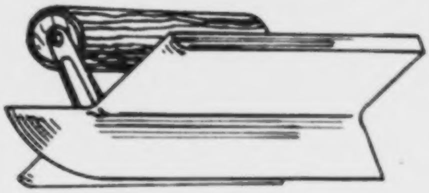
- Jointers (groovers)

INTRODUCTION

Jointers are made of stainless steel, bronze, or malleable iron. Common jointers are 6 inches long; vary in width from 2 to 4½ inches; and have shallow, medium, or deep bite (cutting edges) ranging from 3⁄16 to 1 inch in depth. Some jointers also have a long handle so that they can be used while the finisher is standing. Jointers are used to make joints in sidewalks, pavement, patios, and floor slabs. They provide for concrete crack control and improve the appearance of joints.

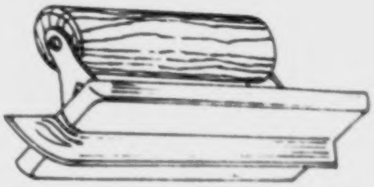
— Deep-bite hand-type jointer

FIGURE 43



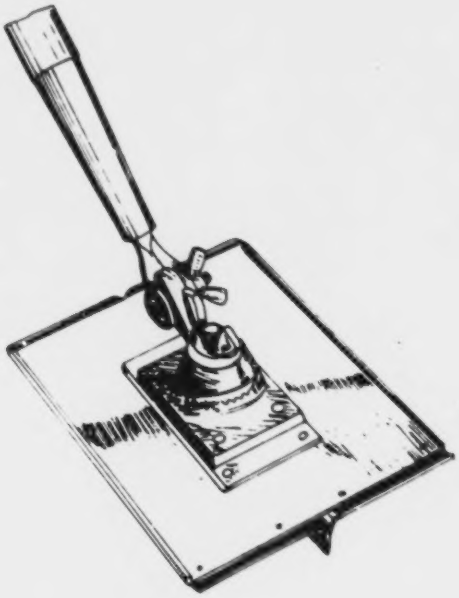
— Small-bite hand-type jointer

FIGURE 44



— Long-handled walking-type jointer

FIGURE 45



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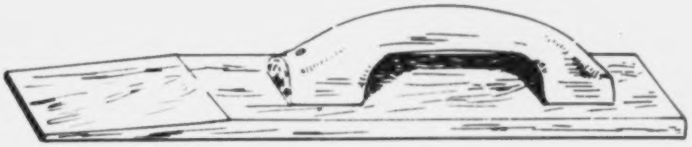
- Floats

INTRODUCTION

Common hand floats are made of wood or metal (steel, aluminum, or magnesium). Metal floats are usually 3½ inches wide, but come in one of two lengths: 12 or 16 inches. Wood floats are available in 12-, 15-, or 18-inch lengths and in 3½- or 4½-inch widths. Metal hand floats prevent drag, are lighter than wood floats, and are preferred on some types of toppings and on air-entrained concrete. Special types of hand floats made of cork, rubber/sponge, or carpet are used to create textured finishes on rubbed concrete.

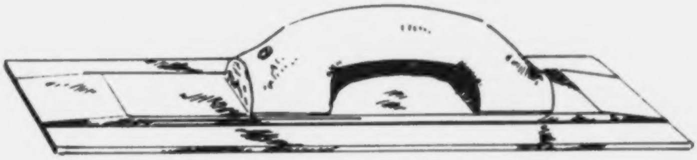
— Wood float

FIGURE 46



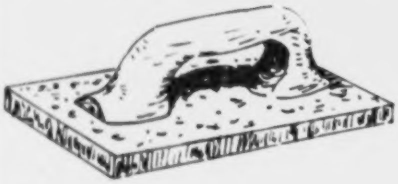
— Magnesium float

FIGURE 47



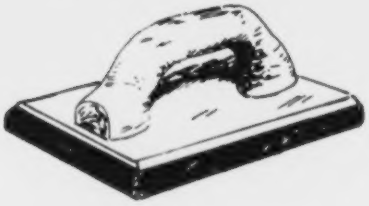
- Special cork float

FIGURE 48



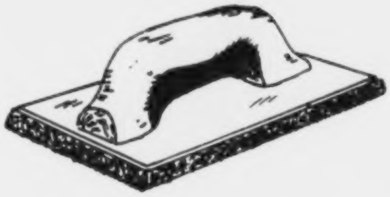
- Special rubber/sponge float

FIGURE 49



- Special carpet float

FIGURE 50



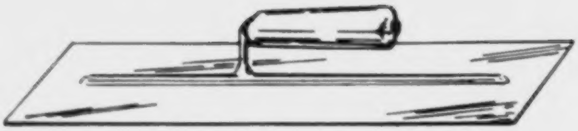
- Hand trowels

INTRODUCTION

Hand trowels are made from either high-carbon tempered steel or special long-wearing stainless steel, and they come in a variety of sizes ranging from 10 to 20 inches long and from 3 to 5 inches wide. The size chosen depends on the job to be done. For example, a long trowel (16 to 20 inches) is usually used for the first troweling process, while a shorter trowel (14 to 16 inches) is used for the final troweling.

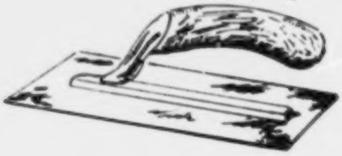
- Finishing trowel

FIGURE 51



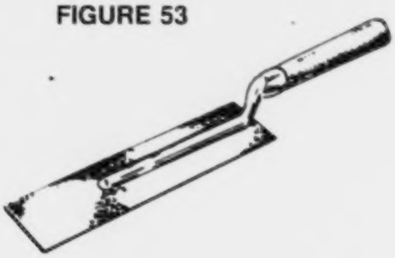
- Midget trowel

FIGURE 52



- Pipe trowel

FIGURE 53



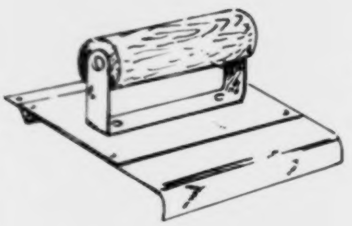
- Combination tools

INTRODUCTION

Combination tools are tools designed to do the special jobs their names suggest: edge and joint, curb and gutter, etc. In the past, these tools were made of metal, but some are now being made from new plastics that have been developed.

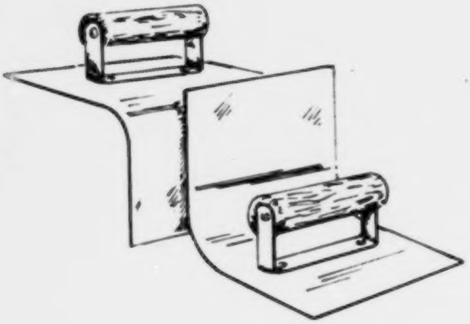
- Edger/jointer

FIGURE 54



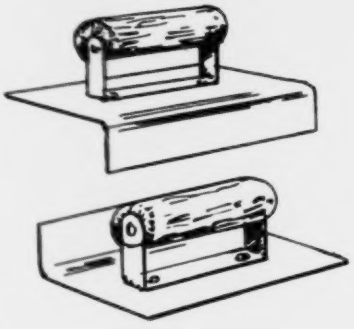
- Curb-and-gutter tool

FIGURE 55



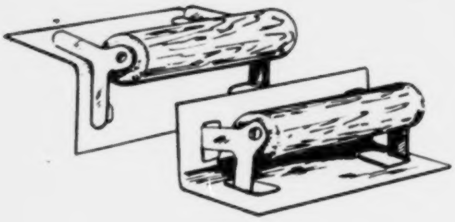
- Step-and-sidewalk tool

FIGURE 56



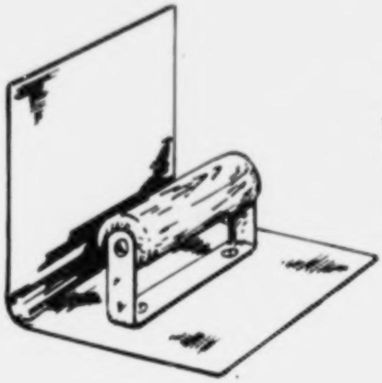
- Step-and-corner tool

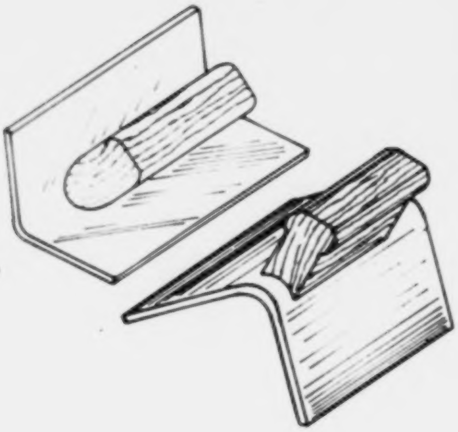
FIGURE 57



— Cove-and-base tools

FIGURE 58 — **FIGURE 59**



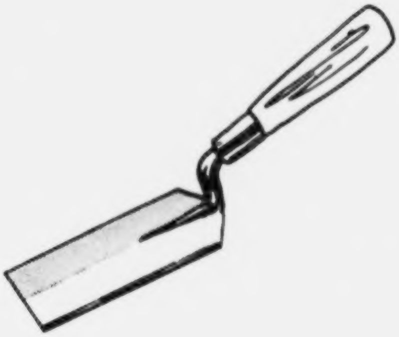


- Hand tools for patching and mixing concrete

  — Margin trowel

  The margin trowel is used primarily to mix mud, patch holes, and grout machine and steel column bases; however, it can also be used to finish patches and small, difficult-to-reach areas.

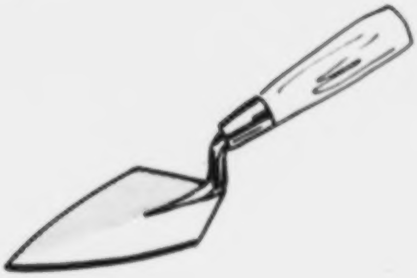
FIGURE 60



- Pointing trowel

  The pointing trowel is used to patch holes and to grout machine bases.

FIGURE 61



Hand tools used for working with hardened concrete

- Hammers

  There are two types of hammers used by finisher to work with hardened concrete: the chipping hammer and the bush hammer. Chipping hammers are used to cut off projections and high places on hardened concrete and to fracture aggregate to present a rough, colorful finish.

— Chipping hammers

FIGURE 62

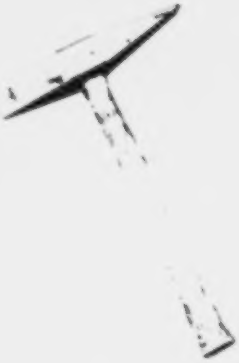
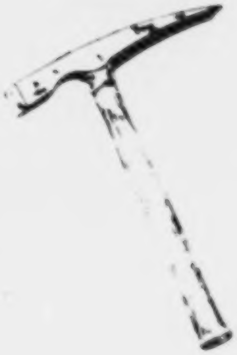
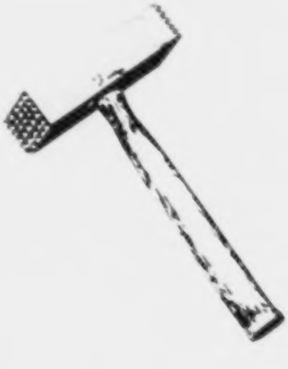


FIGURE 63



— Bush hammer

FIGURE 64

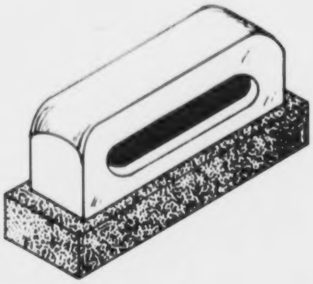


- Carborundum rubbing stones

  Rubbing stones are tools used to smooth partly-hardened concrete. Common rubbing stones are 6 to 8 inches long, 2 to 3½ inches wide, and ¾ to 2 inches thick. Grit sizes range from #24 (coarse) to #150 (fine).

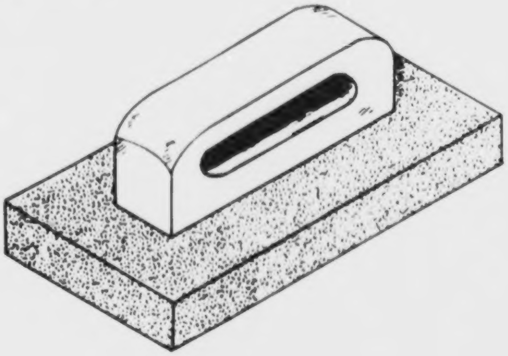
  - Small, 6″ × 2″ × 1″ rubbing stone

FIGURE 65



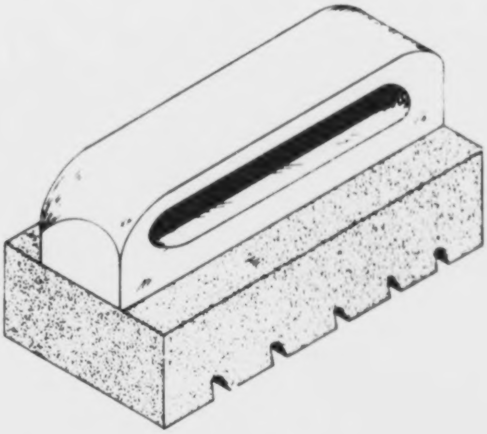
  - Medium-sized, 8″ × 3½″ × ¾″ rubbing stone

FIGURE 66



— Large-sized, fluted, 8″ × 3½″ × 1″ rubbing stone

FIGURE 67

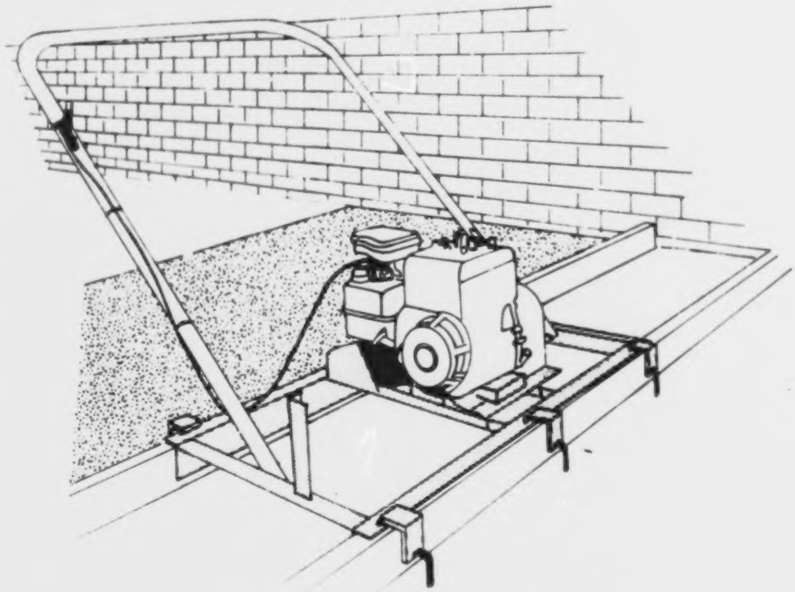


OBJECTIVE 4

State the correct concrete power tools when given a statement describing their intended use. (Assignment Sheet 2)

- Straightedges
  - — Small portable power straightedge

FIGURE 68



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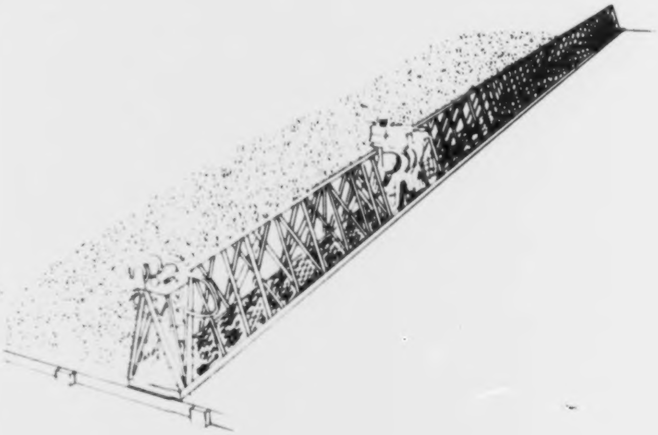
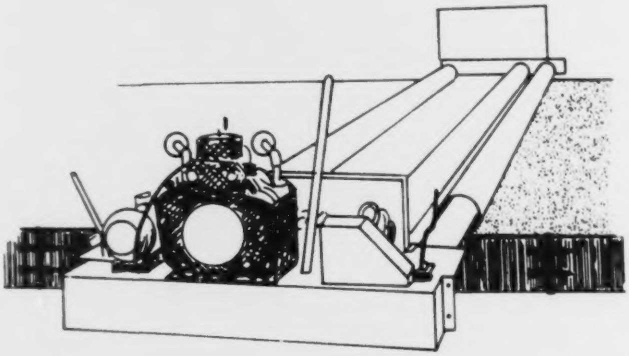
— Heavy-duty vibrating-type power straightedge

FIGURE 69



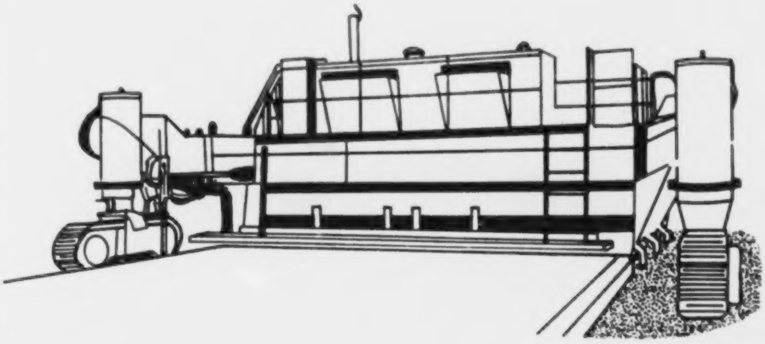
— Roller-type (tube-type) power straightedge

FIGURE 70



— Slip-form paver

FIGURE 71



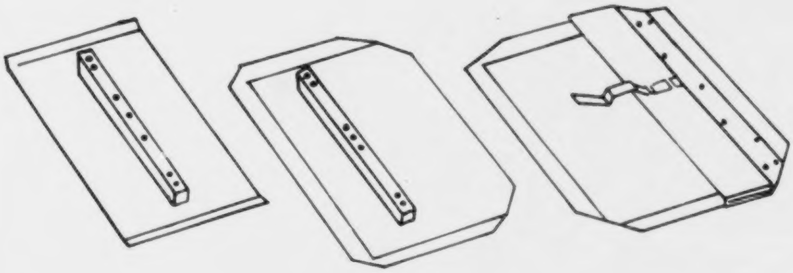
- Power trowel machines and blades

INTRODUCTION

Power trowel machines are used to consolidate and finish concrete surfaces. They are generally used on larger concrete slabs for floors, sidewalks, driveways, and pavements.

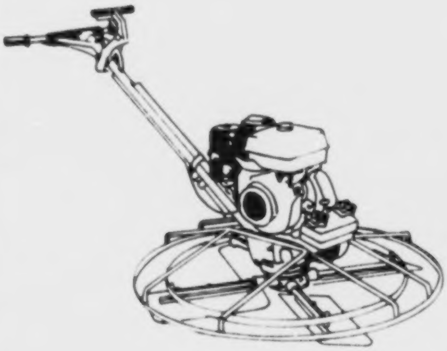
— Trowel machine blades

FIGURE 72



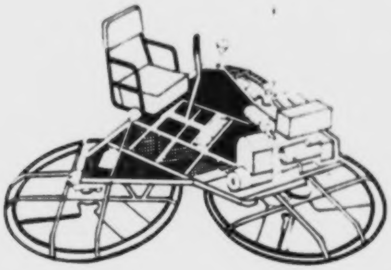
— Trowel machine

FIGURE 73



— Riding trowel machine

FIGURE 74



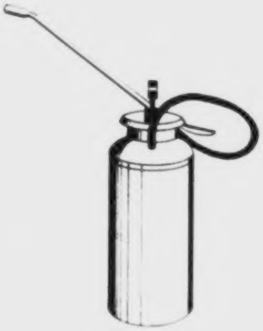
- Sprayers

INTRODUCTION

Sprayers are used to apply form oil to concrete forms, to spray curing compounds, and to mist or fog water over finished concrete to reduce rapid evaporation.

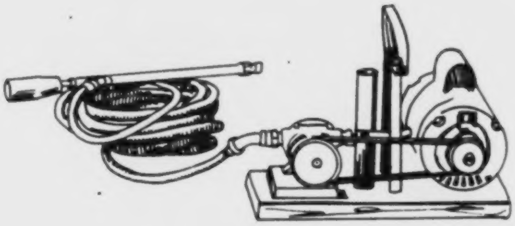
— Hand-held tank sprayer

FIGURE 75



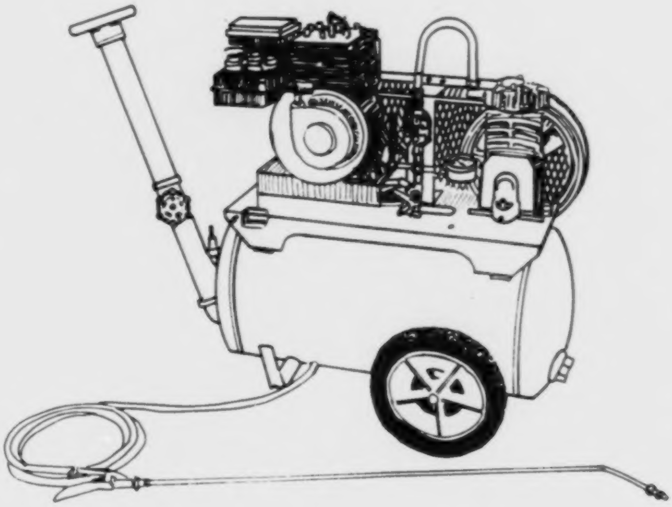
— Electric-powered sprayer

FIGURE 76



— Gasoline-powered sprayer

FIGURE 77



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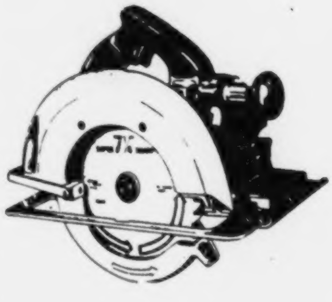
- Power saws

INTRODUCTION

Power saws are used in concrete work to cut control and decorative joints, cut out concrete sections, and to aid in the demolition of structures.

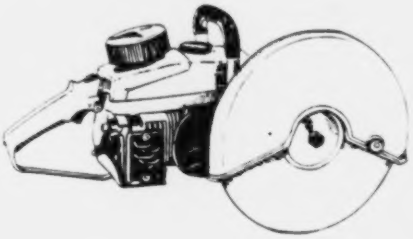
— Portable electric-powered saw

FIGURE 78



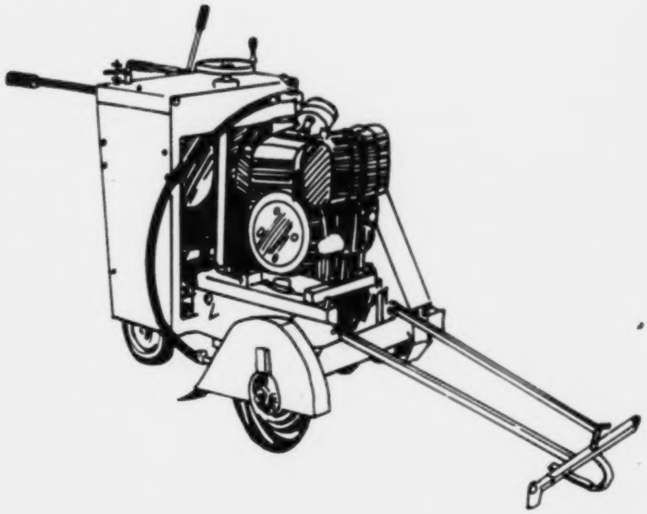
— Portable gasoline-powered saw (concrete saw)

FIGURE 79



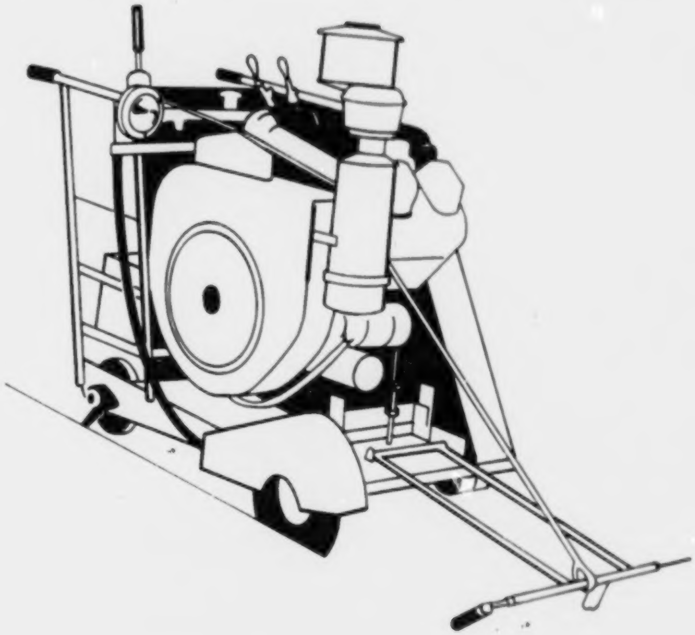
— Medium-duty floor-type power saw

FIGURE 80



— Heavy-duty floor-type power saw

FIGURE 81



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- Power grinders

INTRODUCTION

Power grinders are used to remove seams and projections, reduce high spots, and smooth surfaces.

— Hand-held electric-powered grinder

— Portable, flexible-hose, direct-drive, electric-powered grinder

FIGURE 82

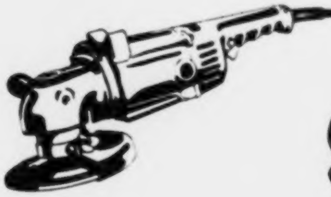
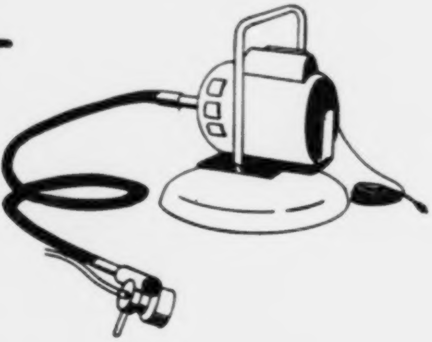
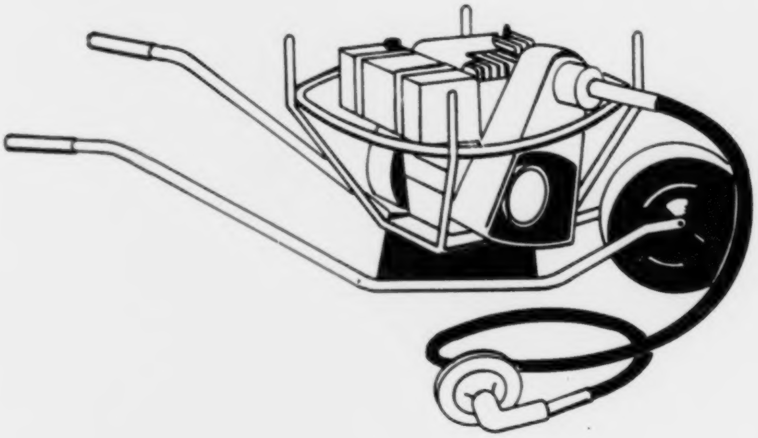


FIGURE 83



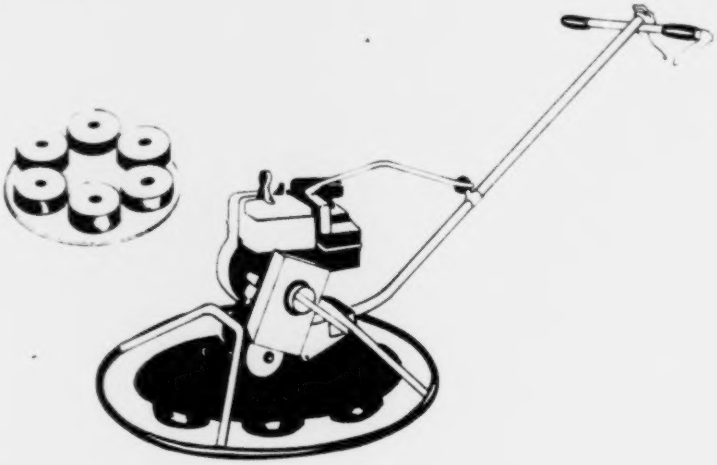
— Portable, vibrator-type, gasoline-powered grinder

FIGURE 84



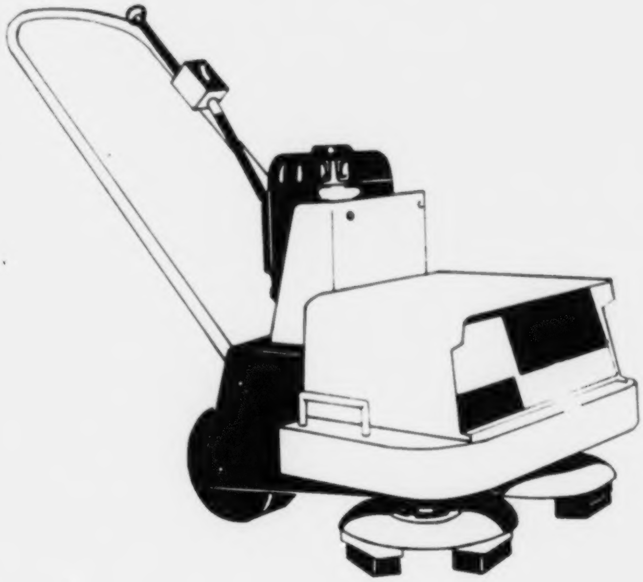
— Trowel machine with grinder head

FIGURE 85



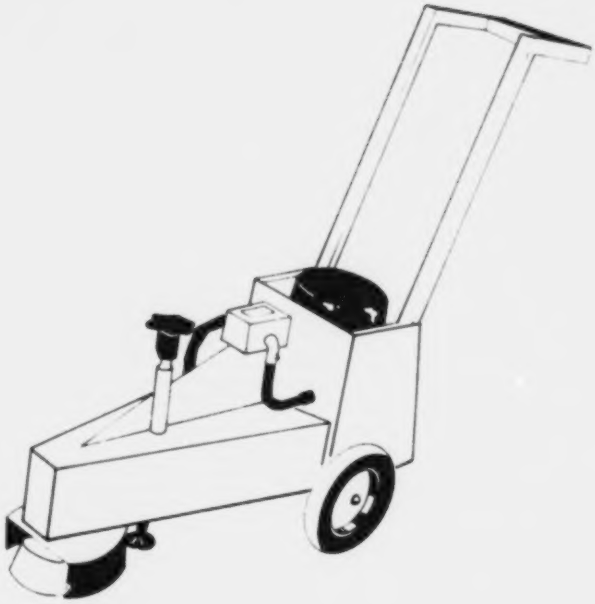
— Commercial-type floor grinder

FIGURE 86



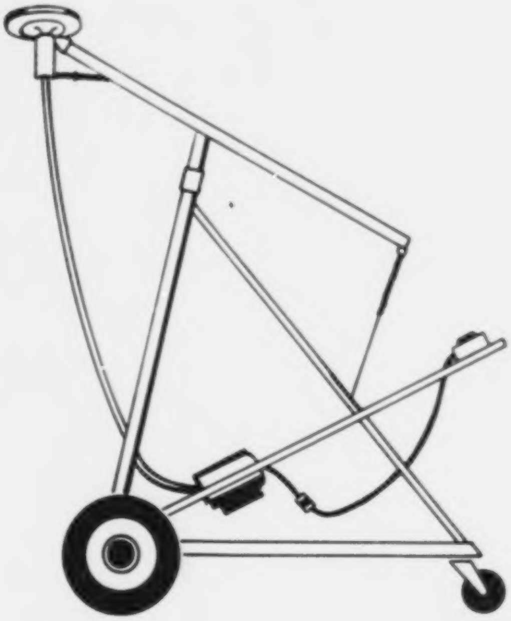
— Edge-and-base grinder

FIGURE 87



- Ceiling grinder

FIGURE 88



ASSIGNMENT SHEET 1

CONCRETE TOOLS

A 2

Name ______________________________ Score __________

OBJECTIVE 3

Given a statement to describe its intended purpose, state the name of the corresponding concrete hand tool.

INTRODUCTION

This assignment sheet will allow you to enhance your knowledge in the purpose of concrete hand tools. By completing the exercise, you will increase your vocabulary of terms used in concrete work.

DIRECTIONS

Reading Comprehension Skills
- Apply word analysis techniques

Research and Reference Skills
- Use in-book reference tools

Functional Reading Skills
- Follow written instructions

Use the Information Sheet and the clues to match the terms below.

_____ 1. Tool used to drive and pull nails

_____ 2. Tool used to drive stakes

_____ 3. A saw used to cut across the grain

_____ 4. A saw used to cut with the grain

_____ 5. A tool to cut rebar

_____ 6. Tool to check squareness

_____ 7. Hand tool used to level forms

_____ 8. An instrument used to set elevations

_____ 9. A tool to pry and to remove forms

a. hacksaw

b. builder's level

c. sledge hammer

d. chalk box and line

e. straightedge

f. utility knife

g. edgers

h. crosscut

i. rip handsaw

j. tamper

k. framing square

_____10. A tool used to mark/lay out long lines

_____11. This tool cuts expansion material

_____12. A hand tool used to cut and twist wires

_____13. Tools used to chip off loose concrete

_____14. This tool screeds concrete

_____15. A tool used to embed aggregate

_____16. A hand tool to improve the appearance of concrete

_____17. Provides for crack control

_____18. Creates textured finish on concrete

_____19. A tool used to mix mud and patch holes

_____20. A tool to smooth partly-hardened concrete

l. claw hammer

m. spirit level

n. margin trowel

o. jointers

p. ripping bar

q. rubbing stone

r. float

s. side-cut pliers

t. chisel

ASSIGNMENT SHEET 2 — CONCRETE TOOLS — A 2

Name ______________________________ Score __________

OBJECTIVE 4

State the correct power tools when given a statement describing their intended use.

INTRODUCTION

By completing the exercise, you will enhance your understanding and increase your vocabulary of terms associated with concrete power tools.

DIRECTIONS

Use the information sheet and the clues to fill the blanks that complete the statements below.

1. Power trowels are used to ______________ and finish concrete surfaces.
2. Power trowels are generally used on ______________ slabs for floors, sidewalks, and pavements.
3. Sprayers are used to apply ______________ ______________, to spray curing compounds and/or mist.
4. Power saws are used in concrete work to cut ______________ and ______________ joints, cut out concrete sections and to aid in the demolition of structures
5. ______________ ______________ are used to remove seams and projections, reduce high spots, and smooth concrete surfaces..

Reading Comprehension Skills
- Apply word analysis techniques

Research and Reference Skills
- Use in-book reference tools

Functional Reading Skills
- Follow written instructions

Functional Writing Skills
- Complete forms and records

ASSIGNMENT SHEET 3

CONCRETE TOOLS

A 2

Name ______________________________ Score __________

OBJECTIVE 5

Complete a safety test pertaining to power tools.

INTRODUCTION

The following written assignment sheet provides you an opportunity to test your knowledge of the safety rules in using concrete power tools. OSHA rules and regulations must be followed; these are but a few of many safety rules.

DIRECTIONS

Complete the following statements by filling in the missing word or words.

Reading Comprehension Skills
- Apply word analysis techniques

Research and Reference Skills
- Use in-book reference tools

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure

1. *Do not* attempt to operate any power tool without being _______________ by your instructor or supervisor on that particular tool.
2. Always wear appropriate safety equipment and _______________ _______________ for the job being done.
3. *Do not* leave power tool running _______________.
4. Assume a _______________ and comfortable position before starting a power tool.
5. *Do not* distract others or let anyone _______________ you while operating a power tool.
6. Be sure that electric power tools is properly _______________ before using.

7. Be sure that power tool is *not* _______________ before performing maintenance or changing accessories.

8. *Do not* use dull or _______________ accessories.

9. Use power tool only for its _______________.

10. *Do not* use a power tool with _______________ or safety devices removed.

11. Use proper extension cord of sufficient _______________ to service particular electric tool you are using.

12. *Do not* operate electrical power tool if your hands or feet are _______________.

13. Before attempting to use it, be familiar with the correct _______________ and adjustments of power tool.

14. Keep a _______________ _______________ on power-float or trowel-machine handle while operating machine.

15. Be sure there is proper _______________ before operating gasoline-powered equipment indoors.

16. Keep fire extinguisher handy when _______________ and operating gasoline-powered equipment.

17. Lift heavy object with your _______________ —*not* with your back.

18. Keep _______________ away from cutting tools such as concrete saws, grinders, and trowel-machine blades.

ASSIGNMENT ANSWERS

CONCRETE TOOLS

A 2

ASSIGNMENT SHEET 1

1. l
2. c
3. h
4. i
5. a
6. k
7. m
8. b
9. p
10. d
11. f
12. s
13. t
14. e
15. j
16. g
17. o
18. r
19. n
20. q

ASSIGNMENT SHEET 2

1. consolidate
2. larger
3. form oil
4. control and decorative
5. power grinders

ASSIGNMENT SHEET 3

1. certified
2. protective clothing
3. unattended
4. safe
5. distract
6. grounded
7. running
8. broken
9. use

10. guards
11. size
12. wet
13. operation
14. firm grip
15. ventilation
16. filling
17. knees or legs
18. feet

WRITTEN TEST

CONCRETE TOOLS

A 2

Name ______________________ Score __________

OBJECTIVE 1

Given a list of terms associated with concrete placement, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. What is the name of a tools used to form a radius at the concrete slab edges?

a. Edger
b. Tamper
c. Float
d. Jointer

_____ 2. To saw wood across or perpendicular to the grain is called

a. ripping
b. blending
c. cross-grained
d. crosscutting

_____ 3. A concrete tool used to eliminate any high or low spots or ridges left after screeding is called a/an

a. darby or bullfloat
b. edger
c. tampering
d. jointer

_____ 4. A tool used to smooth concrete for a dense surface is a

a. jointer
b. darby
c. trowel
d. float

May be photocopied for student use.

_____ 5. A joint cut in concrete to regulate the location of cracking is called a _______________ joint.

a. cure
b. decorative
c. control
d. crack

_____ 6. A liquid applied to newly placed concrete to maintain satisfactory moisture content is known as a _______________ compound.

a. drying
b. curing
c. control
d. wetting

_____ 7. A device used to direct concrete to a specified area and prevent separation of the concrete ingredients is a

a. direction pipe
b. concrete wave
c. drop pipe
d. drop chute

_____ 8. What is the name of a tool used to form a right angle?

a. Bullfloat
b. Square
c. Trowel
d. Angler

_____ 9. To level concrete to a specific grade is called

a. screeding
b. squaring
c. finishing
d. placing

_____10. The process of distributing concrete is also called

a. placing
b. finishing
c. rodding
d. squaring

May be photocopied for student use

______11. What is the term used to describe the process of smoothing concrete to desired surface texture?

a. Placing
b. Rodding
c. Finishing
d. Tapping

______12. Equipment used to prevent concrete from freezing during its curing process are called

a. electrode probes
b. temperature stabilizers
c. freeze pots
d. concrete heaters

______13. A concrete tool used to create joints partly through fresh concrete to act as crack control or to improve joint appearance is called a

a. concrete saw
b. jointer or groover
c. concrete grinder
d. trowel

______14. Concrete with a stiff consistency is known as

a. high-slump concrete
b. hot concrete
c. grout
d. low-slump concrete

______15. Concrete floors with high gloss finishes and made of high psi concrete are called

a. super-flat floors
b. gloss floors
c. finished flat floors
d. ultra flat gloss

May be photocopied for student use.

_____16. Special circuits used to protect workers from electrical shock are known as

a. ground adapters
b. filters
c. GFI
d. EMI

_____17. A cavity left in concrete due to ineffective consolidation is called a/an

a. cove
b. darby
c. honeycomb
d. screed

_____18. What is the term used to describe a concrete finishing tool that smooths with a series of blades rotated by an electric or gasoline motor?

a. Drop chute
b. Power trowel
c. Finishing trowel
d. Edger

_____19. Which of the following terms best describe a method of squaring a line by forming a right triangle?

a. 3-4-5 method
b. Diagonal method
c. xy2 method
d. Triangle method

_____20. The process of cutting wood in the same direction of its grain is called

a. crosscutting
b. staking
c. planing
d. ripping

May be photocopied for student use.

OBJECTIVE 2 **Given a list of alternatives, discriminate between proper and improper safety rules for the care and use of tools.**

_____ 1. Which of the following safety rules would apply whenever a worker notices a cracked hammer handle?

a. Repair or replace broken or damaged tools promptly.
b. Use the correct tool for the job.
c. Do not throw tools.
d. Stay alert when using tools.

_____ 2. A power tool should *not* be operated without

a. electricity
b. gasoline
c. the operator being certified
d. powder

_____ 3. When using electric tools with extension cords,

a. leave the cord exposed to rain
b. use a cord of sufficient size to service the tool
c. cut off the grounding plug
d. be sure the cord is orange in color

_____ 4. When using a gasoline powered-float or trowel machine,

a. keep a firm grip on the handles
b. be sure all guards are in place
c. be sure there is good ventilation
d. All the above are good safety rules.

_____ 5. When replacing the blade of an electric circular saw,

a. ensure proper ventilation
b. be sure the saw is grounded
c. be sure power is connected
d. be sure the power has been disconnected

_____ 6. A power finishing machine is used to

a. finish all types and sizes of concrete slabs
b. consolidate concrete
c. compact concrete
d. finish only low slump concrete

May be photocopied for student use.

_____ 7. To properly care for spraying machines, the unit must be

a. cleaned only when preparing for storage
b. never be cleaned
c. cleaned immediately after each use
d. cleaned when water has been sprayed

_____ 8. Lift heavy objects with your legs—

a. *not* with your arms
b. *not* with your back
c. and with your back
d. All the above.

_____ 9. When filling a gasoline powered tool you *must*

a. turn off the engine
b. keep a fire extinguisher handy
c. use the gasoline type indicated by the tool manufacturer
d. All the above.

_____10. Before using electric power tools, make sure

a. the tool is properly grounded
b. your hands or feet are *not* wet
c. that the tool is being used for its intended purpose
d. All the above.

May be photocopied for student use.

WRITTEN TEST ANSWERS

CONCRETE TOOLS

A 2

OBJECTIVE 1

1. a
2. d
3. a
4. c
5. c
6. b
7. d
8. b
9. a
10. a
11. c
12. d
13. b
14. d
15. a
16. c
17. c
18. b
19. a
20. d

OBJECTIVE 2

1. a
2. c
3. b
4. d
5. d
6. a
7. c
8. b
9. d
10. d

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO CONCRETE FINISH

UNIT NUMBER AND TITLE – A2 – CONCRETE TOOLS

TOTAL NUMBER OF TEST QUESTIONS 30

TOTAL NUMBER OF BASIC SKILL QUESTIONS 2

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	**1-15, 17, 18, 20**	**X**
1	**16**	**S**
1	**19**	**M**
2	**1-10**	**X**

OBJECTIVE SHEET *APPLIED SKILLS* *A 3*

INTRODUCTION

During this unit you will gain basic knowledge and develop skills in the layout, placement, and finishing of concrete.

Due to the permanent nature of concrete, there is emphasis placed on doing the job right. It is very costly when errors are made and rework is required.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student should be able to perform the layout, placement, and finish of concrete. The student will demonstrate these competencies by completing the assignment sheet, job sheets, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student should abe able to show the ability to:

1. Given a list of terms associated with concrete layout and finishing skills, match them to their correct definitions.
2. Given a drawing, identify by name or purpose each major element of an edge form.
3. Given a list of steps to construct a concrete slab, choose the layout, placement, and finish steps in their correct order of completion.
4. Choose factors that determine when to start the concrete finishing operation.
5. Evaluate factors that contribute to the quality of a concrete placement. (Assignment Sheet 1)
6. Lay out and construct an edge form for a sidewalk. (Job Sheet 1)

7. Use a bullfloat. (Job Sheet 2)

8. Use a hand float and finishing trowel. (Job Sheet 3)

9. Use an edger. (Job Sheet 4)

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with concrete layout and finishing skills, match them to their correct definitions.

- Use Information Sheet to discuss terms and definitions associated with concrete layout and finishing skills.
- Show students examples illustrating terms; have the students give definitions of each of them.
- Explain how knowing these terms and definitions will help the students to better understand the information presented in this unit.

Objective 2: Given a drawing, identify by name or purpose of each major element of an edge form.

- Use the information sheets to identify and explain the purpose of each edge form element.
- Use transparency TM-1.

Objective 3: Given a list of steps to construct a concrete slab, choose the layout, placement, and finish steps in their correct order of completion.

- Use the Information Sheet to discuss the sequence in which a concrete slab should be placed.

- Emphasize that double checking steps is necessary to ensure quality work.

APPLICATION

Objective 4: Choose factors that determine when to start the concrete finishing operation.

- Use the Information Sheet to discuss factors.

Objective 5: Evaluate factors that contribute to the quality of a concrete placement. (Assignment Sheet)

- Use the Information Sheet to discuss the factors that contribute to the quality of concrete placement.
- Emphasize that poor planning is a major contributor to poor quality concrete placement. Ensuring materials and manpower are on-site will greatly aid in the attainment of quality.
- Have students review inspection items and then complete Part 1 of the Assignment Sheet.
- Take students to a construction site and have them make an inspection and complete the checklist in Part 2 of the Assignment Sheet.

Objective 6: Lay out and construct an edge form for a sidewalk. (Job Sheet 1)

Objective 7: Use a bullfloat. (Job Sheet 2)

Objective 8: Use a hand float and finishing trowel. (Job Sheet 3)

Objective 9: Use an edger. (Job Sheet 4)

- Allow students to practice the procedures in the job sheets.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.

- Counsel students individually on pretest results and study requirements.

- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.

- Evaluate students on job sheet activities.

- Complete appropriate section of competency profiles.

- Reteach and reevaluate if necessary.

- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Complete appropriate sections of competency profiles.

- Reteach and retest if necessary.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

UNIT REFERENCES

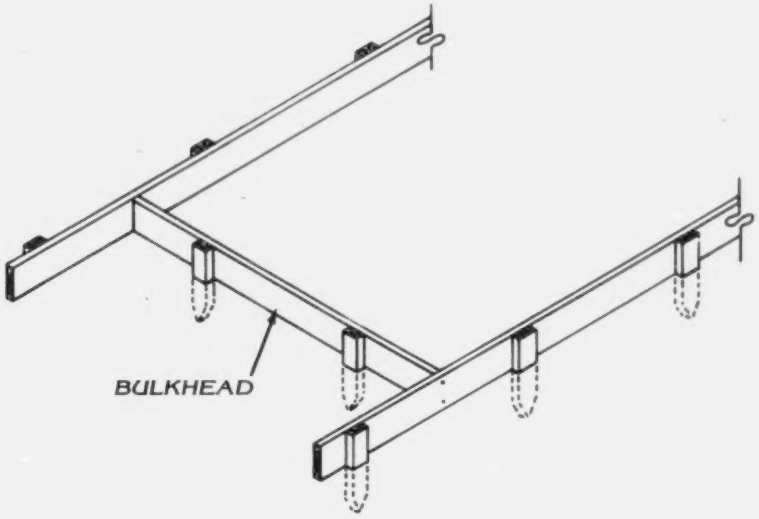
- Hendrix, Laborn J. "Bud." *Concrete and Cement Masonry Skills*. Stillwater, Oklahoma: Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America, 1987.

OBJECTIVE 1

Given a list of terms associated with concrete layout and finishing skills, match them to their correct definitions.

- **bulkhead** — form used to end the concrete pour and to contain the concrete; sometimes used as a screed (Figure 1)

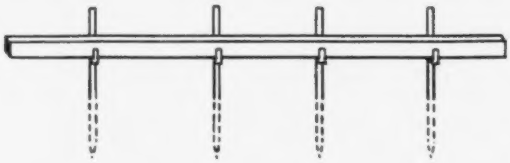
FIGURE 1



- **burning forms** — term used when reinforcing steel is touching forms
- **concrete set** — attainment of significant rigidity
- **curing compound** — liquid coating applied to newly placed concrete to maintain a satisfactory moisture content and favorable temperature in concrete during the early setting stage so that desired properties may develop

- **expansion joint** — a separation between adjoining concrete slabs to allow movement
- **finishing** — the process of working concrete to establish the texture of the exposed surface
- **flush** — even with; having or forming a continuous plane or unbroken surface
- **kerf** — shallow saw-cut in which to lay out line to hold it in place
- **lay down concrete** — term used meaning to float and trowel surface of a concrete slab the first time
- **layout** — detailed plan, design, or arrangement of a project
- **placing** — process of delivering concrete from the supply and distribute it at the established area inside the forms
- **plumbing** — process of determining true or exact vertical
- **scab** — piece of material fastened across a splice or joint to strengthen and hold the two pieces together
- **scales** — divisions or graduations found on the outer and inner edges of the framing square
- **screed** — temporary guide used to support straightedge when leveling concrete to an established grade (Figure 2)

FIGURE 2

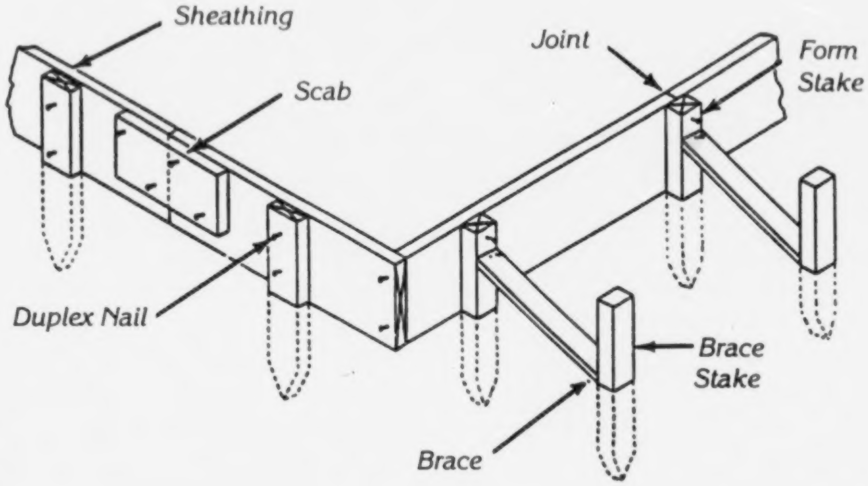


- **screeding** — process of leveling concrete to an established grade

- **slack** — not tight; sagging
- **spreader** — piece of wood or metal inserted between forms to temporarily hold forms the proper distance apart
- **subgrade** — soil prepared and compacted to support a structure or a pavement system

OBJECTIVE 2 **Given a drawing, identify by name or purpose each major element of an edge form.**

FIGURE 3



- Edge form or sheathing — the perimeter of a slab is contained by the edge form. Depending on the thickness of the slab, 1× or 2× material is most commonly used (1×4's, 2×4's, 2×6's, etc.).
- Form stakes — stakes driven into the soil to provide primary support for the sheathing

- Joint — point at which two pieces of sheathing meet. Joints can be reinforced by:
    a. Using a scab
    b. Jointing at the form stake
- Brace and brace stake — these are optional and should be used when the subgrade is shallow or is loose. They provide additional support if the form stakes can't be driven deep or are driven into loose soil.
- Duplex nails or double headed nail — nails preferred due to their ease of removal when the form is disassembled.
- Scab — material used to strengthen the sheathing joints

OBJECTIVE 3

Given a list of steps to construct a concrete slab, choose the layout, placement, and finish steps in their correct order of completion.

- Layout

INTRODUCTION

Layout refers to the planning of and placement of forming members in preparation for placing a concrete structure.

— Layout steps to place a concrete slab

1. Read building plans.
2. Establish building lines or perimeter of slab.
3. Verify squareness of building lines or perimeter.
4. Establish grade.
5. Lay out forms
    a. Set and plumb stakes

6. Build forms and set screeds.
7. Recheck grade and form alignment.

- Concrete placement and finishing

INTRODUCTION

The placement of concrete requires careful planning to ensure all preparatory steps have been completed, tools and manpower are available, weather conditions are favorable, and material is ready.

— Concrete placement and finishing steps

1. Wet the subgrade.
2. Place the concrete within the form.
3. Screed or straightedge concrete.
4. Bullfloat or darby the concrete.
5. Float the slab.
6. Edge the slab.
7. Trowel—finish.
8. Cut joints (if required)
9. Re-edge
10. Finish—2nd pass
11. Apply curing methods—blankets, curing compounds, or mist

OBJECTIVE 4

Choose factors that determine when to start the concrete finishing operation.

INTRODUCTION

The timing in starting the finishing operation is most critical in performing a quality finishing job. The concrete curing process must be evaluated before finishing starts.

- Factors to evaluate
  - Concrete hardening

    NOTE: The concrete should be hard enough to support the weight of an average size person, leaving only slight footprints on the surface.

  - Bleed water should be gone
  - Water sheen or glossy appearance should be gone

OBJECTIVE 5

Evaluate factors that contribute to the quality of a concrete placement. (Assignment Sheet 1)

INTRODUCTION

The quality of concrete placement is most affected by:

a. poor layout

b. inadequate construction site preparation

c. misreading job specifications

d. weather conditions

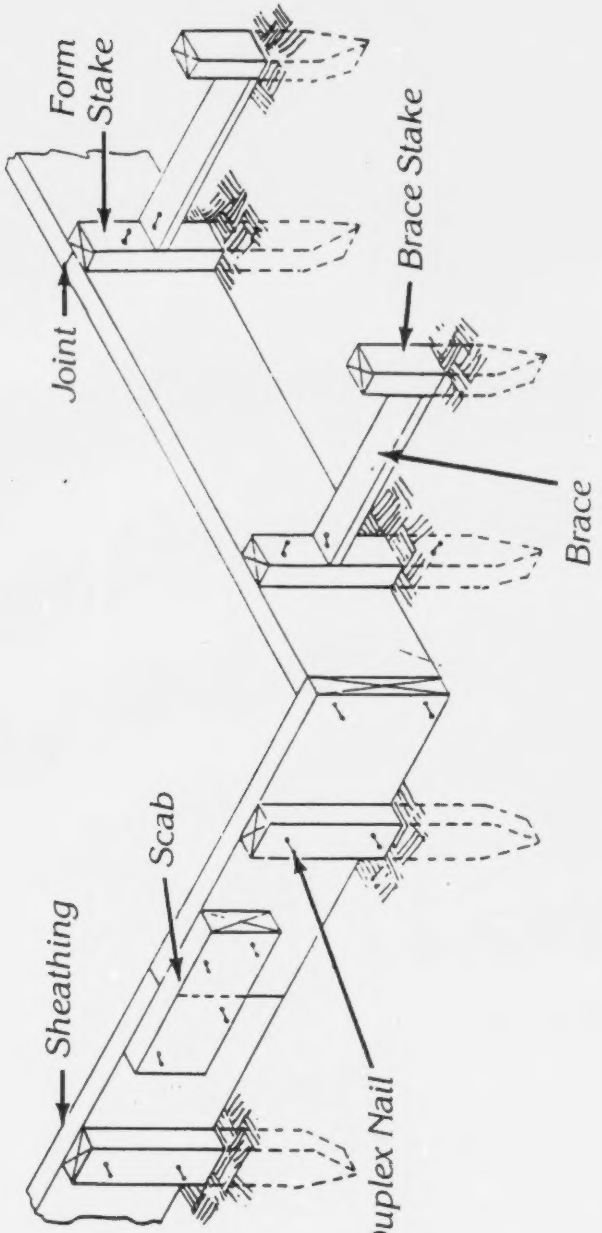
- Poor layout causes
  - Leaving slack in tape
  - Aligning tape, rule or square improperly
  - Not placing end of tape or rule on reference point

  - Reading and recording incorrect numbers
  - Using a dull pencil
  - Not keeping square tight against workpiece
  - Not driving stakes properly
  - Not allowing for thickness of form material
  - Failure to recheck work

- Inadequate construction site preparation can be minimized by ensuring that
  - Subgrade firm and on grade
  - Subgrade has been wet down
  - Forms properly aligned and braced
  - Forms set to proper grade
  - Screeds set at proper location for efficient placing and leveling of concrete
  - Screeds set to proper grade
  - Bulkheads properly braced and set to proper grade
  - Reinforcing steel properly placed
  - Reinforcing not protruding or burning forms
  - Floor drains properly set including holddown for tile
  - Expansion joint material in place and on grade
  - Forms properly set for any recesses in the floor
  - Concrete finishers informed of specified finish
  - Finishing equipment adjacent to the slab site

  - Curing materials and equipment adjacent to the slab site
  - Barricade equipment adjacent to slab site
  - Fire extinguishers readily accessible
  - Sufficient number of finishers
- Misreading job specifications can be minimized by
  - Ensuring the latest version of the specifications are at the site
  - Double checking your work
  - Asking someone else to double check your work
- Weather conditions
  - Freezing temperatures can damage concrete
  - Wet weather can damage exposed concrete
  - Optimum temperature is 55° to 73°F
  - Special curing methods may be necessary in hot and/or dry weather conditions

Edge Form


Form Stake
Joint
Brace Stake
Brace
Scab
Sheathing
Duplex Nail

ASSIGNMENT SHEET 1 — APPLIED SKILLS — A 3

Name ______________________________ Score __________

OBJECTIVE 5

Evaluate factors that contribute to the quality of a concrete placement.

INTRODUCTION

In this exercise you are asked to visit a construction site to evaluate their preparations to place concrete. You will also analyze a sample job specification.

DIRECTIONS

Part 1

Use the site inspection questionnaire to evaluate preparations.

Part 2

Analyze the job specification and answer the questions.

Functional Reading Skills
- Follow written instructions

Data Analysis and Display Skills
- Interpret plans/ blueprints

Cognitive Activity Skills
- Define a problem

Part 1 — Site Preparations

Check appropriate blanks for each "yes" answer.

_____ 1. Is subgrade firm and on grade?

_____ 2. Has subgrade been wet down?

_____ 3. Are forms properly aligned and braced?

_____ 4. Are forms set to proper grade?

_____ 5. Are bulkheads properly braced and set to proper grade?

_____ 6. Are screeds set at proper location for efficient placing and leveling of concrete?

_____ 7. Are screeds set to proper grade?

_____ 8. Is reinforcing steel properly placed?

_____ 9. Is reinforcing steel not protruding or burning forms?

_____10. Are floor drains properly set for proper drainage?

_____11. Has allowance been made for holddown for tile at drains and cleanouts?

_____12. Is expansion joint material in place and set to proper grade?

_____13. Are there any recesses in floor and have screeds or forms been set for them?

_____14. Have concrete finishers been informed of specified finish and any other special specifications?

_____15. Is finishing equipment adjacent to the slab pour?

_____16. Are curing materials and equipment adjacent to the slab pour?

_____17. Is barricade equipment adjacent to slab pour?

_____18. Are fire extinguishers readily accessible?

Comments:

____

____

____

____

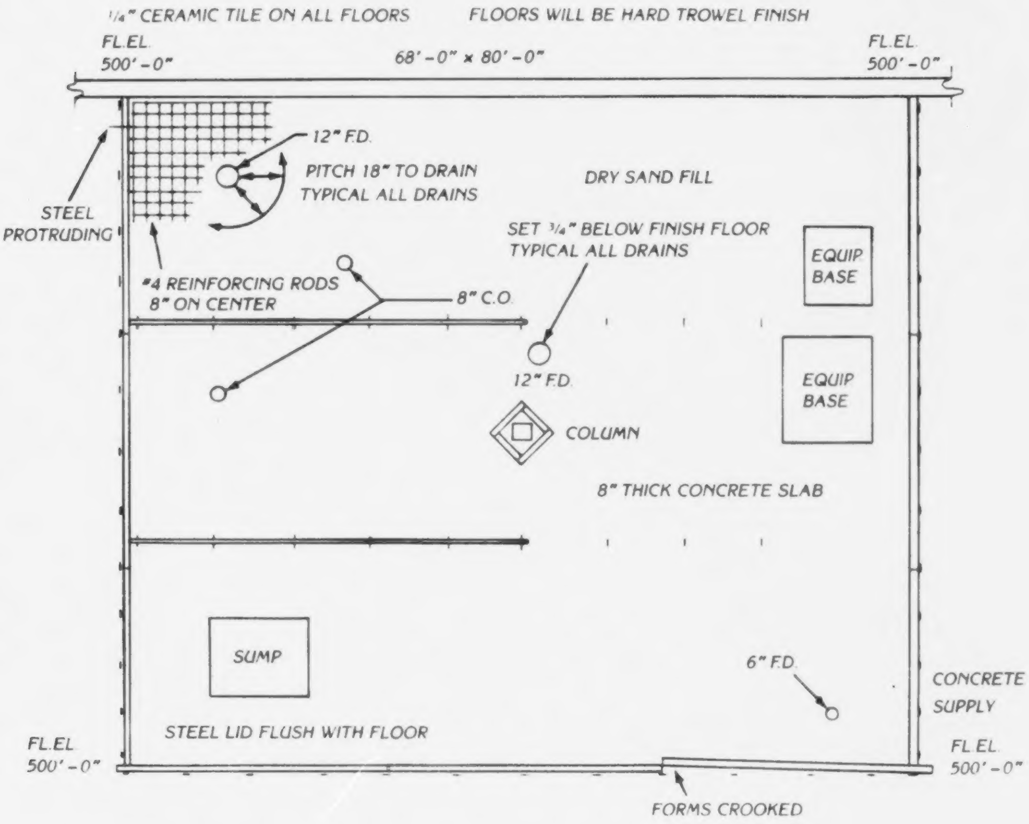
____

Part 2 — Analyze Job Specifications

Using the job specifications shown on the next page, answer the following questions.

1. What is the subgrade elevation? ______________________
2. Does subgrade need wetting down? ______________________
3. Are forms set correctly and adequately braced? ____________
4. Is steel protruding or burning forms? ______________________
5. How many obstacles are there to work around? ____________
6. How much fall and pitch are at drains? ____________________
7. What type of finish is specified? ________________________
8. Will floor covering be used and, if so, how much will you hold down around drains and clean outs? ______________________

JOB SPECIFICATIONS


1/4" CERAMIC TILE ON ALL FLOORS
FLOORS WILL BE HARD TROWEL FINISH
FL.EL.
500'-0"
68'-0" x 80'-0"
FL.EL.
500'-0"
12" F.D.
PITCH 18" TO DRAIN
TYPICAL ALL DRAINS
DRY SAND FILL
STEEL
PROTRUDING
SET 3/4" BELOW FINISH FLOOR
TYPICAL ALL DRAINS
EQUIP.
BASE
#4 REINFORCING RODS
8" ON CENTER
8" C.O.
12" F.D.
EQUIP.
BASE
COLUMN
8" THICK CONCRETE SLAB
SUMP
6" F.D.
CONCRETE
SUPPLY
FL.EL
500'-0"
STEEL LID FLUSH WITH FLOOR
FL.EL.
500'-0"
FORMS CROOKED

ASSIGNMENT SHEET 1

Part 1 — Evaluated to the satisfaction of the instructor.

PART 2

1. 499′-4″
2. Yes
3. No
4. Yes
5. 9
6. ¾″, 18″
7. Hard trowel finish
8. Yes, ¼″

OBJECTIVE 6 **Lay out and construct an edge form for a sidewalk.**

INTRODUCTION During this exercise, you will construct and disassemble an edge form for a sidewalk.

TOOLS AND EQUIPMENT

- Hard hat and goggles
- Sledge hammer
- Claw hammer
- Circular saw and extension cord
- Handsaw
- 25′ steel tape
- Hand level
- String line
- Builder's level and rod
- Stakes
- 2×4s for form sides
- 8d and 16d duplex nails

PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

	Yes	No
1. Check with your instructor to establish the location of the sidewalk.	___	___
2. Put on safety equipment.	___	___
3. Set the form stakes for one side of the sidewalk. For this exercise, the sidewalk will be 4′0″ × 12′0″ × 4″ thick..		
a. Locate the side you are going to set first.	___	___

Data Analysis and Display Skills
- Interpret plans/ blueprints

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

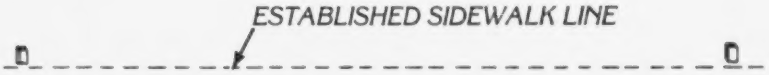
Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

Yes No

b. Drive line stakes at each end of this line approximately 12 feet apart. (Figure 4) ___ ___

NOTE: Be sure to allow for the thickness of the forms when setting line stakes.

FIGURE 4

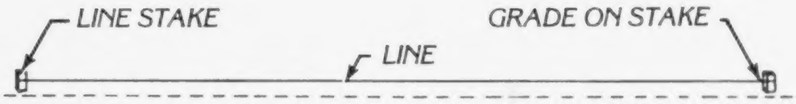


4. Establish sidewalk grade on the two line stakes. ___ ___

5. Secure string line to one line stake at established grade and stretch line tight to the established grade on stake at opposite end. (Figure 5) ___ ___

NOTE: Be sure that line is tight and that there is no sag in it.

FIGURE 5

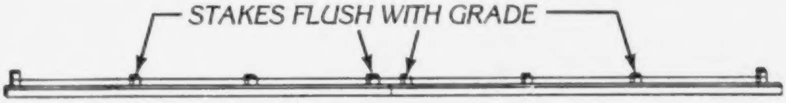


6. Lay out forms for this section of sidewalk, starting at one end and laying them end to end. ___ ___

Yes No

7. Drive all intermediate stakes 3 to 3½ feet apart; drive each stake straight down with face of stake plumb with line and top of stake flush with line. (Figure 6) ___ ___

FIGURE 6



8. Nail 2×4 forms to stakes with top of 2×4 flush with top of stakes. Be sure form is of straight and sound stock. (Figure 7) ___ ___

FIGURE 7

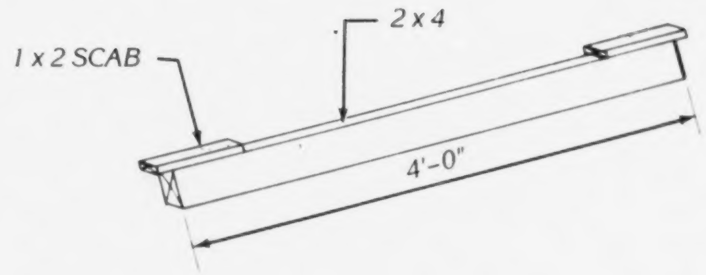
9. Align form and brace if necessary. ___ ___

10. Construct two spreaders to use to set form on opposite side of sidewalk. ___ ___

    NOTE: A spreader can also be used to establish the subgrade. (Figure 8)

Yes No

FIGURE 8

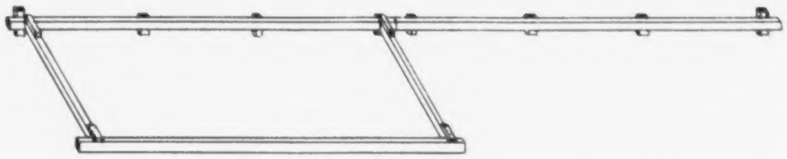


11. Set form stakes for opposite side of sidewalk.

    a. Lay out forms for this section of sidewalk, starting at one end of the completed form, lay forms end to end. ___ ___

    b. Lay one end of each spreader between erected form and loose forms. (Figure 9) ___ ___

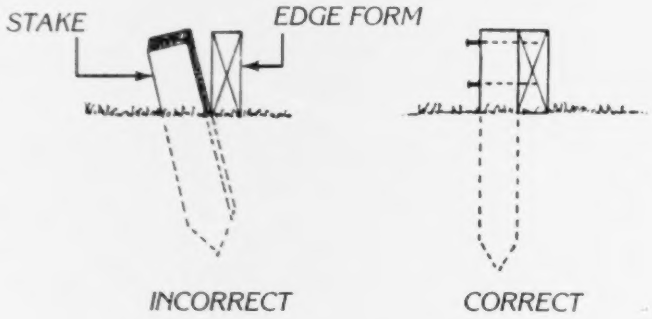
FIGURE 9



	Yes	No
c. With form held in place, drive stakes opposite those in erected form; drive stakes straight down with solid blows of the sledge hammer. Keep the forms and spreader tight against each other while driving stakes.	___	___

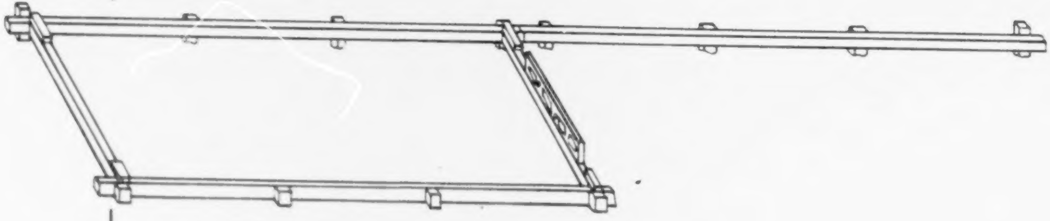
NOTE: If the stakes are not driven straight down, the other form will be forced out of alignment. (Figure 10)

FIGURE 10



	Yes	No
d. Establish grade by placing hand level on top of spreader board. For drainage, the sidewalk may be slightly sloped across its width (Figure 11)	___	___

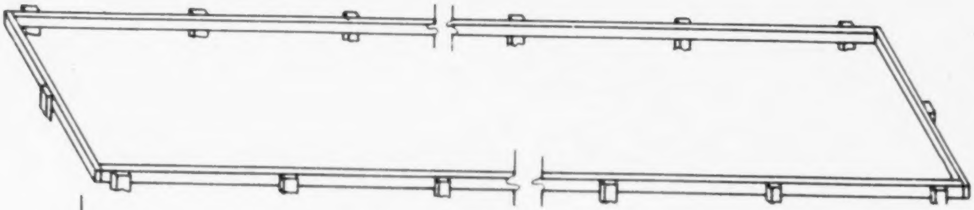
FIGURE 11



	Yes	No
e. Drive stakes down to grade. If not possible, drive and cut stakes off at grade.	___	___
f. Nail 2×4 forms to stakes with top of form flush with top of stake. To avoid stake movement, you may use a sledge hammer to place in back of stake while driving nails.	___	___
g. Continue these procedures to complete second side of form.	___	___
12. Align second side of the form, maintaining 4′-0″ between the two.	___	___
13. Cut two 2×4s long enough (at least 4′-3″) to go across ends of forms for bulkheads.	___	___
14. Nail bulkheads in place, with tops of bulkheads flush with top of both side forms.	___	___
15. Drive a stake at the center of each bulkhead to keep the concrete from forcing bulkheads out. (Figure 12)	___	___

NOTE: A scab can be nailed across the joint where the two forms butt each other or they may be toenailed together.

FIGURE 12



Yes No

16. Be sure none of the stakes protrude above the form. The top edge of the form will act as a guide in finishing the top of the sidewalk. ___ ___

17. When working in loose or moist soil, additional support can be given to the form by packing dirt or gravel against the outside. ___ ___

18. Ask your instructor to evaluate your work. Other issues may be considered prior to concrete pour:

    a. Add expansion joints to the concrete per specifications. ___ ___

    b. The amount of excavation to form the sidewalk subgrade is determined by the stated slab thickness (4 inches) and the soil conditions. Sidewalks poured in moist areas will require a base of gravel or cinders. Check the specifications. ___ ___

    c. Check the building plans for required reinforcement. ___ ___

19. Disassemble the forms in the reverse order of construction. Be careful with the form material to allow its reuse. ___ ___

20. This completes the exercise on the construction of a sidewalk. Put away all tools and material. Clean up the construction site. ___ ___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Proper use of safety equipment	4	3	2	1
Form material cut to proper length	4	3	2	1
Form set to proper grade	4	3	2	1
Stakes drive to proper level ($\pm\frac{1}{16}$") and correct locations ($\pm\frac{1}{4}$")	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 7

Use a bullfloat.

INTRODUCTION

Bullfloating is done immediately after the concrete has been screeded. When possible, bullfloat in a direction that is perpendicular to the direction of the straightedging process.

TOOLS AND EQUIPMENT

- Eye protection and hard hat
- Rubber boots and gloves
- Bullfloat

PROCEDURE

Functional Reading Skills
- Interpret forms and records
- Follow written instructions

Job Acquisition/Development Skills
- Master specific job task/procedure

	Yes	No
1. Put on safety equipment.	___	___
2. Adjust bullfloat handle to your reach (so that the bullfloat will be comfortable for you to use).	___	___
3. Make first pass.		
a. Set bullfloat blade on edge of concrete.	___	___
b. Position bullfloat handle low enough so that leading edge of blade (Point A) is raised slightly. (Figure 13)	___	___

Yes No

FIGURE 13

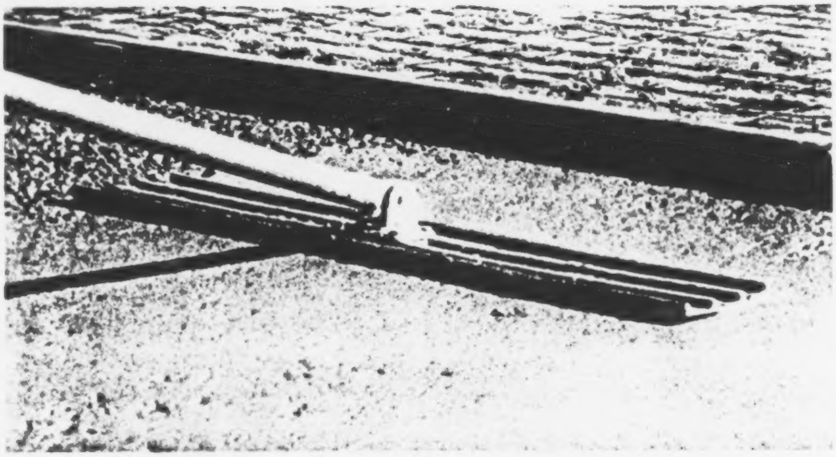
c. Begin forward stroke by pushing and sliding bullfloat across slab while keeping handle low enough to maintain slightly raised leading edge of blade. ___ ___

d. As you near end of forward stroke, jiggle bullfloat slightly while raising bullfloat handle to flatten blade against concrete surface. (Figure 14) ___ ___

NOTE: This procedure helps break the vacuum under the blade and prevents dishing of the concrete surface.

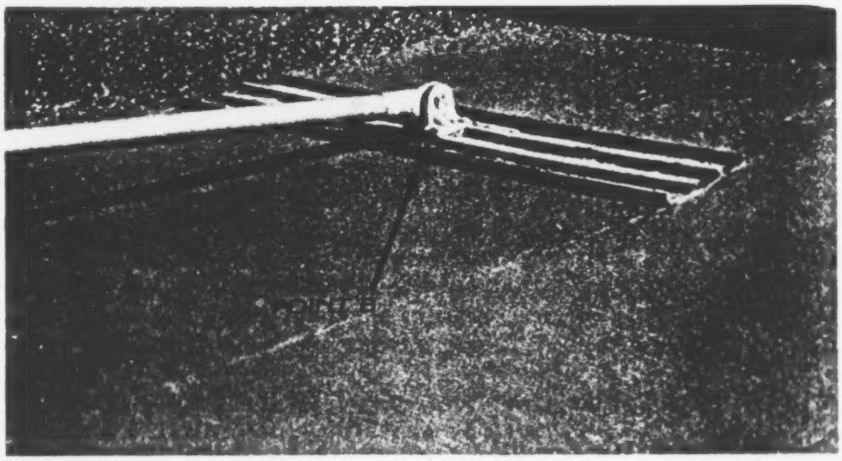
Yes No

FIGURE 14



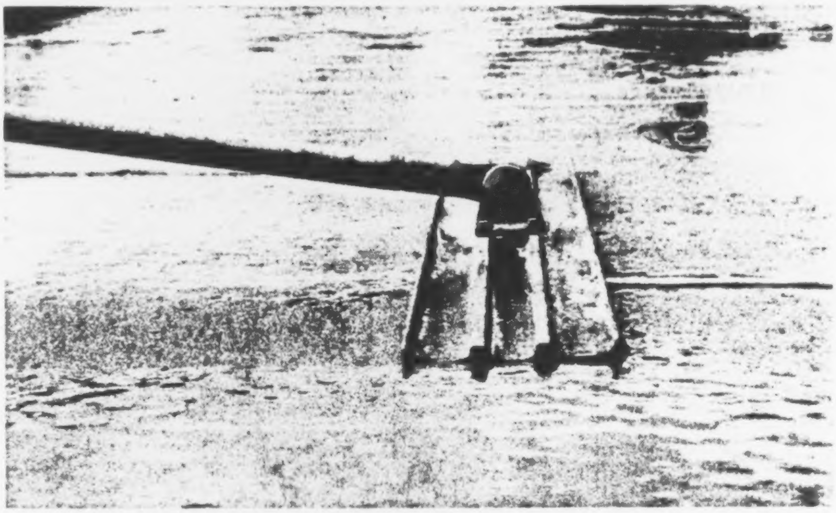
e. When you reach end of forward stroke, raise handle slightly and without hesitating start return stroke, keeping leading edge of blade (Point B) raised very slightly (almost flat) to concrete surface. (Figure 15) ___ ___

FIGURE 15



	Yes	No
f. If necessary, make another forward stroke, keeping blade as flat as possible while preventing blade edges from digging into concrete surface.	___	___
4. Make second pass.		
a. Place bullfloat so that blade will overlap first pass by at least 6 inches. (Figure 16)	___	___

FIGURE 16



	Yes	No
b. Repeat procedures.	___	___
5. Continue until slab has been completely bullfloated, overlapping passes by at least 6 inches and following procedures.	___	___

	Yes	No
6. Have instructor inspect your work.	___	___
7. Clean tools and work area; properly store tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Smooth/uniform finish	4	3	2	1
Ridges out	4	3	2	1
Surface of concrete is closed	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 8

Use a hand float and finishing trowel.

INTRODUCTION

During this exercise, you will practice the use of a hand float and finishing trowel. Through experience, you will eventually know hen it is appropriate to begin the floating process. However, for now, check with your instructor before performing this job sheet.

TOOLS AND EQUIPMENT

- Eye protection and hard hat
- Hand float
- Large finishing trowel
- Knee pads

NOTE: A slab measuring 3′ × 3′ × 4″, used as a HVAC base, would be an excellent training tool.

PROCEDURE

Functional Reading Skills
- Interpret forms and records
- Follow written instructions

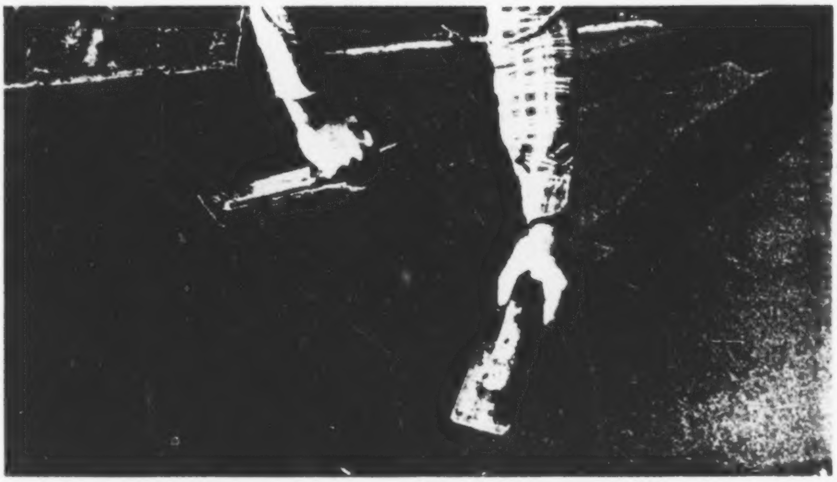
Job Acquisition/ Development Skills
- Master specific job task/procedure

	Yes	No
1. Put on safety equipment.	___	___
2. While holding hand float in dominant hand and trowel in the other hand, position yourself on your knees near edge of forms.	___	___
3. Lean out over edge of concrete, supporting yourself on trowel. (Figure 17)	___	___

NOTE: This position allows you to reach further out.

Yes No

FIGURE 17



4. Make first pass with hand float.

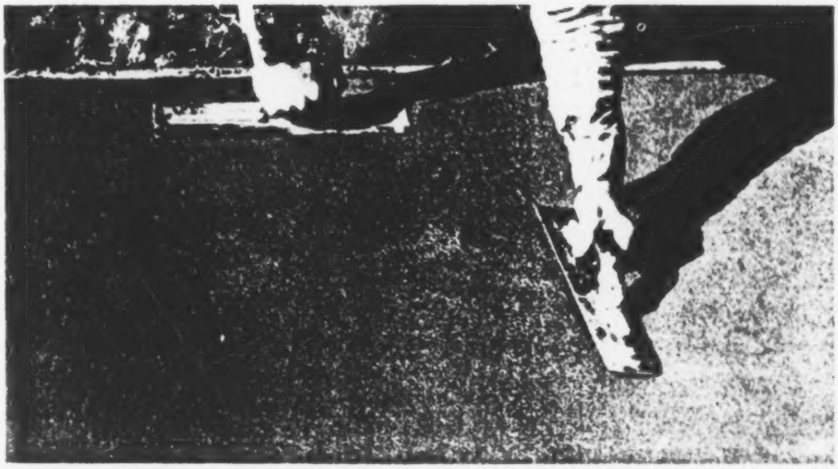
   a. Hold float flat on concrete surface. (Figure 18) ___ ___

   b. Move float in a wide, semicircular motion. (Figure 18) ___ ___

172

Yes No

FIGURE 18



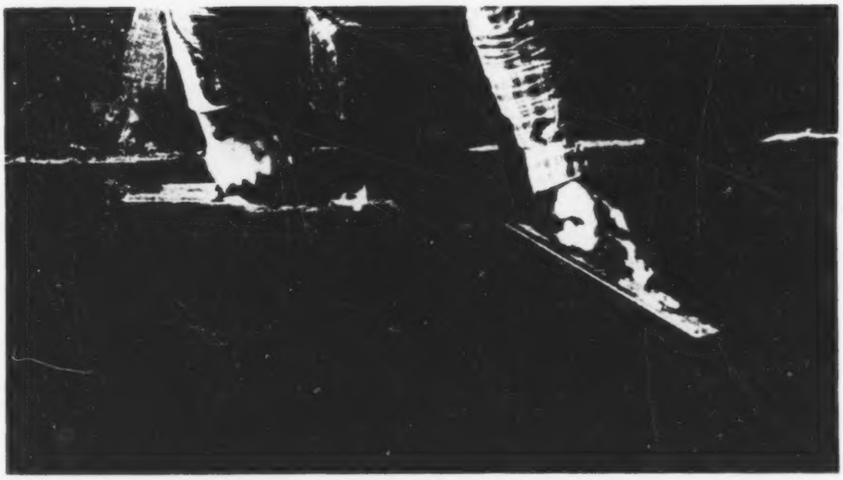
c. Level high spots or imperfections by using a forward-and-backward saving motion of the float. ___ ___

5. Maintain position and make second pass with hand float.

    a. Move float back (toward you), while overlapping first pass. (Figure 19) ___ ___

Yes No

FIGURE 19



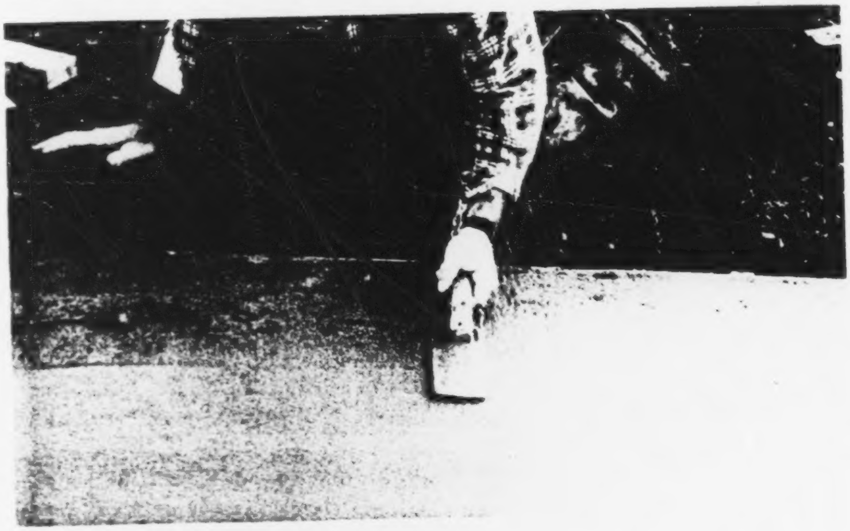
b. Follow procedures in Step 4 for completing pass. ___ ___

6. Maintain position and continue floating, following procedures in Steps 4 and 5, until all of area you can reach has been floated except area along form edge. ___ ___

7. Reposition yourself and float area along edge of forms, moving float at a right angle to form; continuing until entire edge has been floated. (Figure 20) ___ ___

Yes No

FIGURE 20



8. Reposition yourself as in Steps 2 and 3, but place trowel in dominant hand and float or trowel in the other hand. (See Figure 21) ___ ___

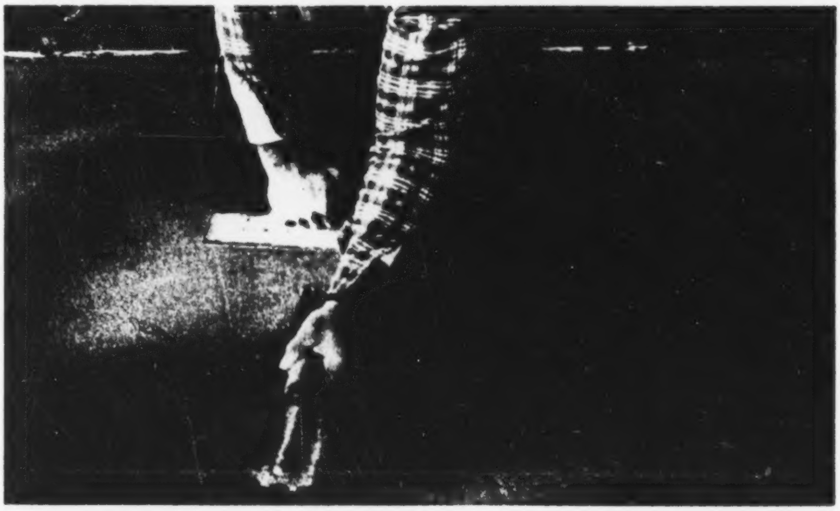
9. Make first trowel pass.

   a. Hold trowel flat on concrete surface. ___ ___

   b. Move trowel in a wide, semicircular motion. (Figure 21) ___ ___

Yes No

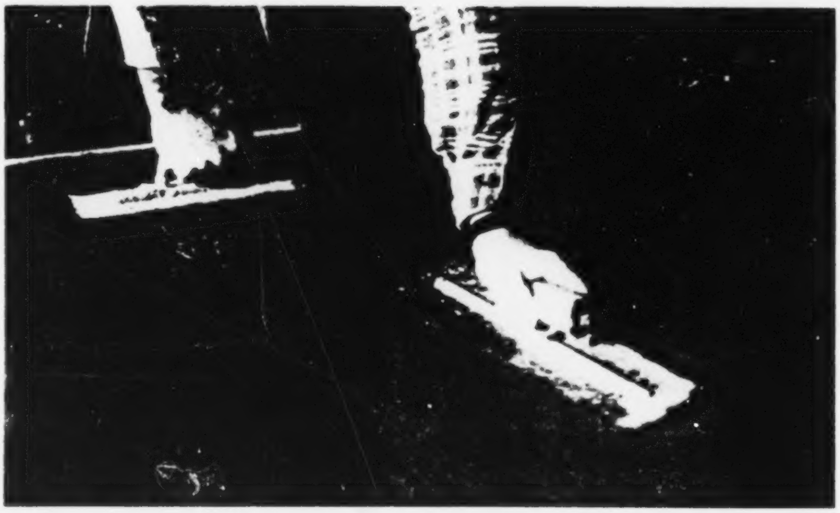
FIGURE 21



10. Maintain position and make second pass with trowel.
    a. Move trowel back (toward you), while overlapping first pass. (Figure 22) ___ ___

Yes No

FIGURE 22

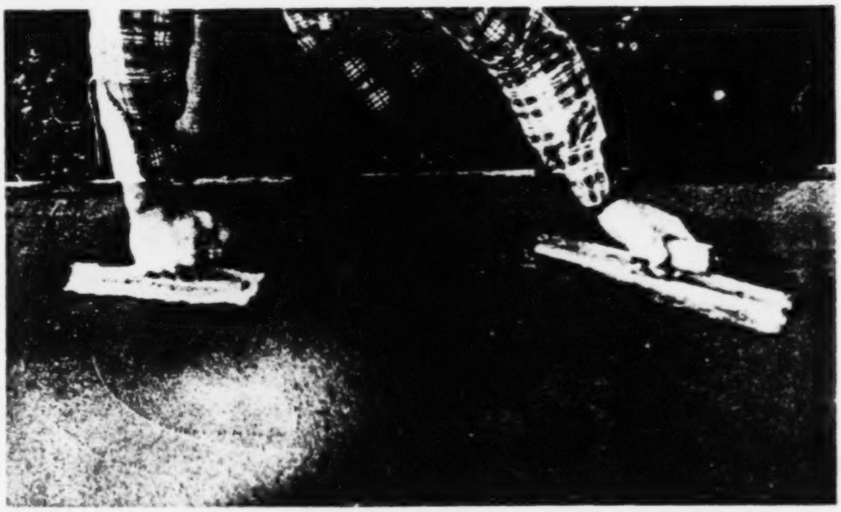


b. Follow procedures in Step 9 for completing pass. ___ ___

11. Maintain position and continue troweling, following procedures in Steps 9 and 10 until all of area you can reach has been troweled except area along form edge. (Figure 23) ___ ___

Yes No

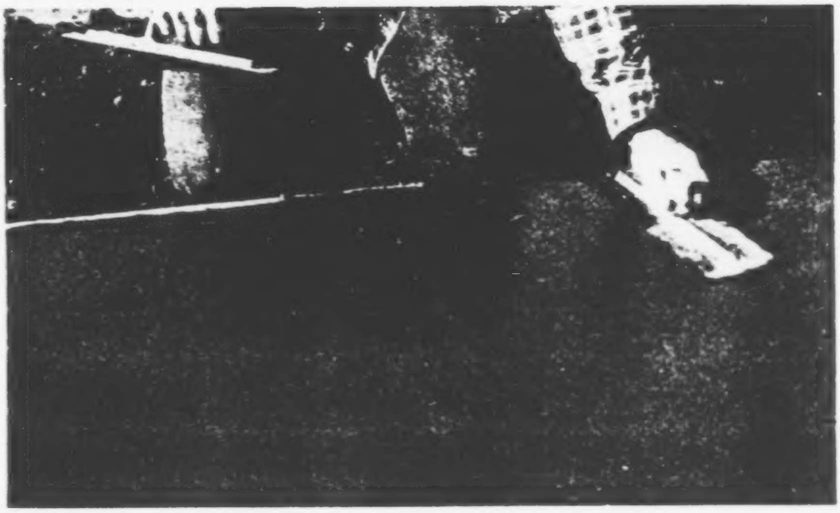
FIGURE 23



12. Reposition yourself as in Step 7, and trowel area along edge of forms, moving trowel at right angle to form. (Figure 24) ____ ____

Yes No

FIGURE 24



13. Continue positioning yourself along form edge and following Steps 2 through 12 to float and trowel until entire slab has been floated and troweled. ___ ___

NOTE: As concrete hardens and moisture evaporates, the concrete may have to be troweled another time or two (sometimes even more). On each successive troweling, you should use a smaller trowel and tilt the blade a little more. You will find that as the concrete hardens you will need to increase the pressure placed on the trowel in order to remove imperfections as you trowel.

	Yes	No
14. Have instructor inspect your work.	___	___
15. Clean work area and tools, and properly store tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Uniform smooth finish	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

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3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
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1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 9

Use an edger.

INTRODUCTION

Edging improves the appearance and protects the edges of the concrete slab.

TOOLS AND EQUIPMENT

- Eye protection and hard hat
- Margin trowel
- Edger
- Knee pads

PROCEDURE

Functional Reading Skills
- Interpret forms and records
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure

	Yes	No
1. Put on safety equipment.	___	___
2. Float slab edges. (See Job Sheet 3.)	___	___
3. Position yourself on your knees near edge of forms.	___	___
4. Make arm's length pass with margin trowel to cut along inside of form.	___	___

NOTE: Making a pass with a margin trowel helps to force the aggregate away from the form and makes it easier to use the edger.

Yes No

5. Make arm's length pass with edger.

   a. Hold edger with leading edge (Point A) raised just enough to keep edger from digging into concrete and with rear edge (Point B) pressed down lightly. (Figure 25) ___ ___

FIGURE 25

   b. Begin forward stroke by gliding edger across top of concrete until your arm is nearly fully extended. ___ ___

      NOTE: *Do not* press too hard on the edger; the edger should make hardly any indentation on the top surface of the concrete.

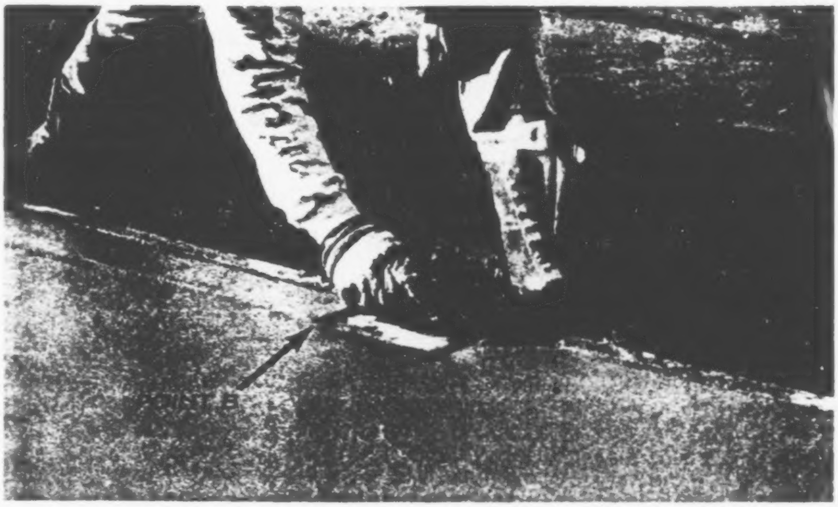
Yes No

c. At end of forward stroke (when arm is fully extended), lift edger from concrete while edger is still in forward motion. ___ ___

NOTE: If the edger is not in motion when it is removed from the concrete, the concrete surface may be pulled up with the edger.

d. With arm still extended, begin return stroke, drawing edger backward (toward you) with leading edge (Point B) tilted up slightly. (Figure 26) ___ ___

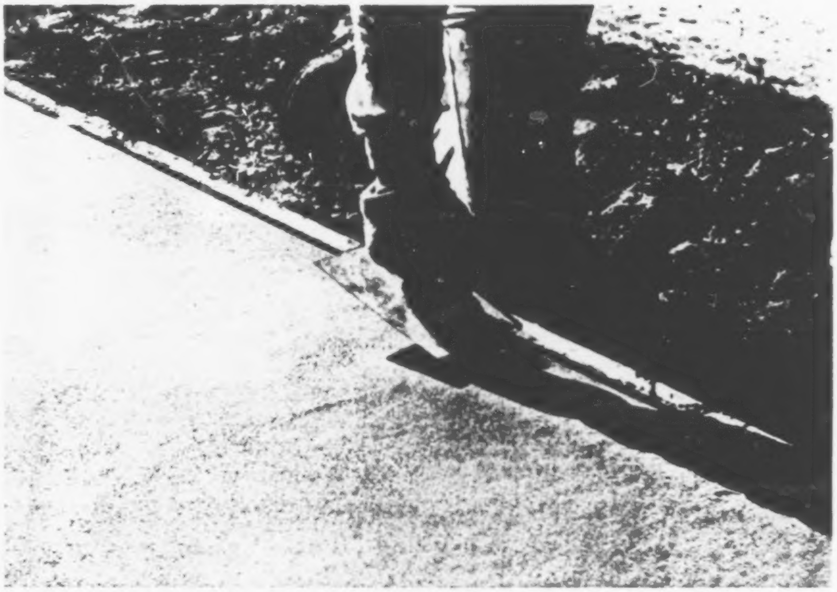
FIGURE 26



Yes No

e. At end of return stroke, lift edger from concrete surface while edger is still in motion. (Figure 27) ___ ___

FIGURE 27



6. Continue repositioning yourself and edging, following the procedures in Steps 3 and 5, until slab has been completely edged. ___ ___

7. Have instructor inspect your work. ___ ___

8. Clean work area and tools, and properly store tools and equipment. ___ ___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Edge properly shaped	4	3	2	1
Surface with no edge line	4	3	2	1
Straight edges	4	3	2	1
Clean/store tools	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training

3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required

2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill

1 **Unskilled** – Is familiar with process, but is unable to perform job

APPLIED SKILLS A 3

Name ______________________________ Score ________

OBJECTIVE 1

Given a list of terms associated with concrete layout and finishing skills, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. The process of leveling concrete to an established grade is called

- a. placing
- b. screeding
- c. plumbing
- d. finishing

_____ 2. Using a trowel to work concrete to establish the texture of the exposed surface is called

- a. finishing
- b. plumbing
- c. rodding
- d. placing

_____ 3. What is the term used to describe a shallow saw-cut in which to fit a layout line to hold it in place?

- a. Slot
- b. Scab
- c. Kerf
- d. Rod

_____ 4. Which term describes a temporary guide used to support a straightedge during leveling?

- a. Bullfloat
- b. Screed
- c. Spreader
- d. Scale

May be photocopied for student use.

_____ 5. A detailed plan, design, or the arrangement of a project is called its

a. map
b. view
c. projection
d. layout

_____ 6. What is the process of delivering concrete from the supply and distributing it into the forms?

a. Placing
b. Dropping
c. Finishing
d. Rodding

_____ 7. A term used to describe a sagging line is one that is

a. taunt
b. flush
c. slack
d. firm

_____ 8. A term that describes reinforcing steel that touches the forms is

a. scab steel
b. left wild
c. burning forms
d. outer steel

_____ 9. A separation between adjoining concrete slabs that allows movement is called a/an

a. lap
b. expansion joint
c. kerf
d. concrete lip

May be photocopied for student use.

_____10. What is the term used to describe a form used to end off the concrete pour and contain the concrete; sometimes used as a screed?

a. screed bank
b. spreader
c. stake
d. bulkhead

_____11. A liquid coating applied to newly placed concrete to maintain a satisfactory moisture content is known as a

a. curing compound
b. moisture layer
c. subgrade layer
d. moisture agent

_____12. A term used to indicate that concrete has attained a significant rigidity is

a. subgrade firm
b. rigid mud
c. firm topping
d. concrete set

_____13. A piece of wood or metal inserted between forms to temporarily hold them at the proper distance apart is called a

a. scab
b. kerf
c. spreader
d. bulkhead

_____14. The process of determining true or exact vertical is called

a. leveling
b. plumbing
c. flush
d. plane

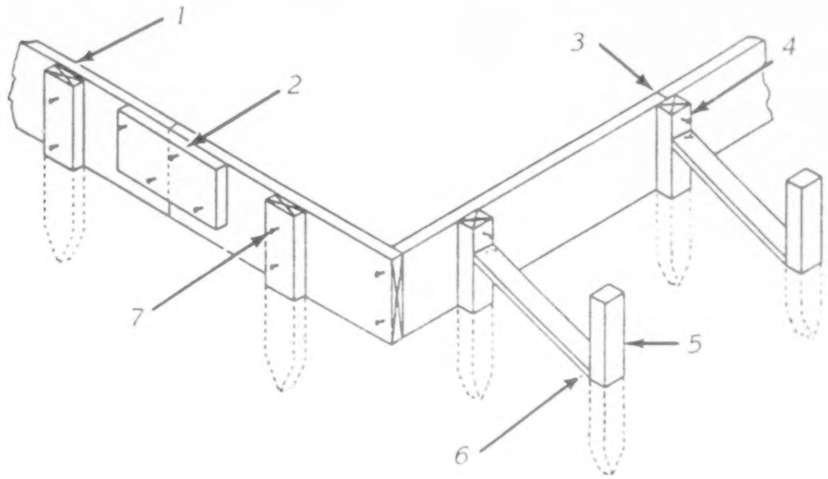
May be photocopied for student use.

_____15. A form member that fastens across a splice or joint to strengthen and hold the two pieces together is known as a

a. scab
b. spreader
c. stake
d. joint pad

OBJECTIVE 2

Given a drawing, identify by name or purpose each major element of an edge form. Use the following figure to answer questions 1-5.



May be photocopied for student use.

_____ 1. What is the purpose of the form element identified by the number 4?

a. Forms the slab perimeter
b. Provides additional support
c. Used to strengthen joints
d. Provides primary support for the sheathing

_____ 2. Which statement best describes the purpose of the forming element identified by the number 1?

a. Forms the slab perimeter
b. Provides additional support
c. Used because of their ease of removal
d. Provides support for the sheathing

_____ 3. What is the purpose of the element identified by the number 3?

a. Provides additional support
b. Forms the slab perimeter
c. Used to strengthen joints
d. Where two sheathing members come together

_____ 4. Which statement best describes the element identified by the number 2?

a. Provides support for the sheathing
b. Used because of their ease of removal
c. Used to strengthen the sheathing joints
d. Provides additional support

_____ 5. What element is identified by the number 7?

a. Sheathing
b. Scab
c. Duplex nail
d. Form stake

May be photocopied for student use.

OBJECTIVE 3 **Given a list of steps to construct a concrete slab, choose the layout, placement, and finish steps in their correct order of completion.**

_____ 1. During a layout, the first step is to

a. build the forms
b. establish the grade
c. read the building plans
d. recheck form alignment

_____ 2. Of the layout steps listed below, which step should be performed first?

a. establish the grade
b. lay out the forms
c. build the forms
d. recheck form alignment

_____ 3. Which of the following layout steps should be performed first?

a. Verify square of perimeter
b. Lay out forms
c. Establish perimeter
d. Establish grade

_____ 4. The last step of the layout procedures is to

a. verify square of perimeter
b. read building plans
c. establish grade
d. recheck grade and form alignment

_____ 5. When placing concrete, after the layout procedures are complete, the first step is to

a. wet the subgrade
b. place concrete in the form
c. apply curing compounds
d. float the slab

May be photocopied for student use.

_____ 6. Which of the following placement/finish steps should be done first?

a. Bullfloat or darby the slab
b. Rod or straightedge the slab
c. Float the slab
d. Edge the slab

_____ 7. Which of the following should be done as the last step of the placement/finishing operation?

a. Trowel the surface
b. Apply curing methods
c. Edge the slab
d. Bullfloat the concrete

OBJECTIVE 4 **Choose factors that determine when to start the concrete finishing operation.**

_____ 1. What is the most critical factor in starting the finishing operation and to ensure the highest quality finish?

a. Type of curing compound
b. Size of the bullfloat
c. Type of trowel used
d. The timing or curing process of the concrete

_____ 2. Which of the following evaluation factors should be used to decide when to start finishing the concrete?

a. Hardness of the concrete
b. Size of the slab
c. Size of the trowel
d. Type of curing compound used

_____ 3. When evaluating the appearance of the concrete surface to determine when to start finishing, look for

a. bleed water should be gone
b. water sheen should be gone
c. glossy appearance not noticeable
d. all of the above

May be photocopied for student use.

OBJECTIVE 5

Evaluate factors that contribute to the quality of a concrete placement.

Evaluated through completion of an assignment sheet.

NOTE: Objectives 6-9 are evaluated on job sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

APPLIED SKILLS

OBJECTIVE 1

1. b
2. a
3. c
4. b
5. d
6. a
7. c
8. c
9. b
10. d
11. a
12. d
13. c
14. b
15. a

OBJECTIVE 2

1. d
2. a
3. d
4. c
5. c

OBJECTIVE 3

1. c
2. a
3. c
4. d
5. a
6. b
7. b

OBJECTIVE 4

1. d
2. a
3. d

OBJECTIVE 5

To be evaluated by instructor

Page 1 of 1

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO CONCRETE FINISH

UNIT NUMBER AND TITLE – A3 – APPLIED SKILLS

TOTAL NUMBER OF TEST QUESTIONS 30

TOTAL NUMBER OF BASIC SKILL QUESTIONS 2

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-15	X
2	1-5	X
3	1, 2, 5-7	X
3	3, 4	M
4	1-3	X
5	Evaluated on Assignment Sheet	X

INTRODUCTION TO CONCRETE FINISH
COMPETENCY PROFILE

Student ______________________________ Soc. Sec. No. ______ – ______ – ______
Last First MI

PROGRAM ______________________ Grade 9 10 11 12 Adult SCHOOL ______________________

INSTRUCTOR ______________________ SCHOOL ADDRESS ______________________ PHONE ______________

STUDENT'S HOME ADDRESS ______________________ DATE OF BIRTH ______________________ PHONE ______________

STUDENT'S EMPLOYER ______________________ ADDRESS ______________________ PHONE ______________

CONTACT IN CASE OF EMERGENCY ______________________ PHONE ______________

ADDRESS ______________________

OR ______________________

ADDRESS ______________________ PHONE ______________

The above information can be used for school records and/or to ensure safety of students. This confidential information is not to be released to employers or to the general public.

ON-THE-JOB TRAINING/WORK EXPERIENCE

DURATION OF EMPLOYMENT	JOB TITLE	EMPLOYER	SUPERVISOR'S NAME	ADDRESS OF EMPLOYER	PHONE

This agency does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, qualified handicap, or disability.

Duplicate one copy for each student.

SPECIFIC JOB COMPETENCIES

DIRECTIONS: Evaluate the trainee using the rating scale below, and check the appropriate number to indicate the degree of competency. The numerical ratings of 4, 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below.

Rating Scale:
4 — **Skilled** — can perform job independently with no additional training
3 — **Moderately Skilled** — has performed job independently during the training program; limited additional training may be required
2 — **Limited Practice** — has practiced job during training program; additional training is required to develop skill
1 — **Exposure Only** — general information provided with no practice time; close supervision needed and additional training required
0 — **No Exposure** — no information or practice provided during training program; complete training required

UNIT A1

4	3	2	1	0	
☐	☐	☐	☐	☐	*Concrete Materials*
☐	☐	☐	☐	☐	1. Given a list of terms associated with concrete materials, match them to their correct definitions
☐	☐	☐	☐	☐	2. Given a list of alternatives, discriminate between proper and improper concrete safety guidelines
☐	☐	☐	☐	☐	3. From a list, choose proper characteristics of concrete
☐	☐	☐	☐	☐	4. Provided a representative drawing, identify types of concrete joints
☐	☐	☐	☐	☐	5. Select the correct alternative of statements about the types and uses of concrete reinforcement
☐	☐	☐	☐	☐	6. From alternatives, choose the proper action to prevent common concrete failures
☐	☐	☐	☐	☐	7. Choose the correct response to factors that affect the curing of concrete
☐	☐	☐	☐	☐	8. Calculate the cubic yards needed to pour a structure
☐	☐	☐	☐	☐	9. Perform a concrete slump test
☐	☐	☐	☐	☐	10. ______________________
					WRITTEN TEST SCORE ______________________

UNIT A2

4	3	2	1	0	
☐	☐	☐	☐	☐	*Concrete Tools*
☐	☐	☐	☐	☐	1. Given a list of terms associated with concrete placement, match them to their correct definitions
☐	☐	☐	☐	☐	2. Given a list of alternatives, discriminate between proper and improper safety rules for the care and use of tools
☐	☐	☐	☐	☐	3. Given a statement to describe its intended purpose, state the name of the corresponding concrete hand tool
☐	☐	☐	☐	☐	4. State the correct concrete power tools when given a statement describing their intended uses
☐	☐	☐	☐	☐	5. Complete a safety test pertaining to power tools
☐	☐	☐	☐	☐	6. ______________________
					WRITTEN TEST SCORE ______________________

UNIT A3

4	3	2	1	0	
☐	☐	☐	☐	☐	*Applied Skills*
☐	☐	☐	☐	☐	1. Given a list of terms associated with concrete layout and finishing skills, match them to their correct definitions
☐	☐	☐	☐	☐	2. Given a drawing, identify by name or purpose each major element of an edge form
☐	☐	☐	☐	☐	3. Given a list of steps to construct a concrete slab, choose the layout, placement, and finish steps in their correct order of completion
☐	☐	☐	☐	☐	4. Choose factors that determine when to start the concrete finishing operation
☐	☐	☐	☐	☐	5. Evaluate factors that contribute to the quality of a concrete placement
☐	☐	☐	☐	☐	6. Lay out and construct an edge form for a sidewalk
☐	☐	☐	☐	☐	7. Use a bullfloat
☐	☐	☐	☐	☐	8. Use a hand float and finishing trowel
☐	☐	☐	☐	☐	9. Use an edger
☐	☐	☐	☐	☐	10. ______________________
					WRITTEN TEST SCORE ______________________

Use of This Document

Use of this document can be used to record information about the student and the skills mastered by the student. This information is useful in documenting student progress during the training program and to provide information about the student's qualifications to potential employers and for entry into advanced training programs. Instructors using AGC-CIMC instructional materials are authorized to reproduce this document as required for use in their training programs.

INTRODUCTION TO CONCRETE FINISH

CIM

READING SKILLS

WRIT

UNITS OF INSTRUCTION

	Reading Comprehension									Research and Reference								Functional Reading					
UNITS OF INSTRUCTION	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Select useful resources	Locate resources	Find materials in library	Use standard reference	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers	Interpret forms and records	Follow written instructions	Interpret graphics and symbols	Use content area vocabulary	Interpret abbreviations/acronyms	Read aloud
Concrete Materials																			●	●			
Concrete Tools									●					●					●				
Applied Skills																		●	●	●			

	Language		Composition							
UNITS OF INSTRUCTION	Use standard grammar and correct spelling, punctuation, and capitalization	State ideas clearly	Use complete sentences	Develop preliminary outline	Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays	Proofread and edit	Construct graphics and symbols
Concrete Materials										
Concrete Tools										
Applied Skills										

C BASIC SKILLS DOCUMENTATION MATRIX

ING SKILLS

MATH SKILLS

Research					Functional Writing							Operation and Calculation														Math Application											Data Analysis and Display													
Take notes	Use notecards	Create bibliography	Use footnotes	Outline material	Complete forms and records	Write instructions	Write letters	Write job applications	Write resumes	Use word processing	Use computer graphics	Round off numbers	Estimate answers	Use scientific notations	Use exponential notations	Calculate with whole numbers	Calculate with fractions	Calculate with decimals	Convert whole numbers to fractions	Convert whole numbers to decimals	Solve numerical expressions	Solve formulae and equations	Obtain squares and square roots	Convert units of measure	Perform metric calculations	Solve word problems	Select/apply mathematical formula	Select/apply mathematical procedure	Use English and metric measures	Solve time/rate/distance problems	Solve ratio/proportion problems	Solve percent problems	Apply techniques of scaling	Apply algebra principles	Apply geometry principles	Apply trigonometry principles	Interpret charts and tables	Interpret graphs (type)	Collect /record data	Apply sampling techniques	Apply principles of probability	Construct charts and tables	Construct graphs	Calculate statistics	Interpret statistics	Interpret blueprints/plans	Make measurements	Perform banking transactions	Make change	Solve practical problems
					●							●														●	●		●																					
																													●																	●	●			

X

SCIENCE SKILLS

94-010741

Functional Math												General Science									Life Science							Physical Science					Earth Science							
Make change	Solve practical problems	Calculate gross earnings	Solve income/expense problems	Prepare a budget	Calculate interest	Solve interest problems	Calculate sales tax	Determine income tax	Use calculator for computation	Use computer for computation	Use computer spreadsheets	Apply computing skills	Apply scientific method of inquiry	Conduct experiments	Investigate science ethics	Investigate science history	Investigate/apply economics in technology	Use scientific instruments	Investigate/apply technology	Collect specimens	Identify/classify living organisms	Investigate biological history of the earth	Investigate food chains, webs, pyramids	Investigate/apply principles of human development	Investigate/apply principles of genetics/heredity	Investigate/apply principles of anatomy/physiology	Investigate health issues	Analyze/classify matter	Investigate forms/changes of matter	Investigate forms/changes of energy	Investigate/apply chemical properties	Investigate/apply physical laws	Investigate physical characteristics of the earth	Investigate geological history of the earth	Investigate physical forces acting on the earth	Solve problems of longitude, latitude, and time zones	Investigate conservation of physical resources	Investigate conservation of living resources	Investigate issues of environmental impact	Apply science principles to environmental issues
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ORAL COMMUNICATION SKILLS

UNITS OF INSTRUCTION	Oral Presentation									Listening				Interactive Communication										General Relating							
	Make informative presentations	Make persuasive presentations	Present personal opinion/viewpoint	Use good speaking techniques	Select/use words effectively	Use effective body language	Present appropriate appearance	Integrate audio and/or visual materials in oral presentations	Adapt presentation to specific audience	Apply active listening skills	Distinguish fact, opinion, and inference	Draw conclusions/make generalizations	Analyze/identify point of view	Give/follow oral directions	Apply questioning techniques	Conduct/receive interviews	Analyze/apply nonverbal communication	Work effectively in a group	Communicate with clients/customers/patients	Communicate with co-workers	Communicate with supervisors	Communicate with professional colleagues/associates	Apply telephone etiquette	Investigate/apply communication process models	Analyze/apply nonverbal communication	Investigate/apply cross-cultural communication	Interact with co-workers	Interact with supervisors	Interact with clients/customers/patients	Interact with professional/colleagues/associates	Interact with family/friends
Concrete Materials																															
Concrete Tools																															
Applied Skills																															
* Use this line for entering your state or local codes for graduation requirements or learner outcomes																															

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INTERPERSONAL OR RELATING SKILLS

					Teamwork, Cooperation															Leadership, Influence						
Interact with family/friends	Participate in group activities	Participate in industrial relations/functions	Identify personal values/attitudes	Apply information to life experiences	Identify values/attitudes	Identify needs/drives	Select/apply appropriate behavior	Investigate/identify personal styles	Investigate/identify group/corporate climate	Give/receive feedback	Identify hidden purposes	Investigate/apply group dynamics	Control undesirable/inappropriate behavior	Resolve conflicts	Clarify goals/objectives	Devise "win/win" situations	Build consensus	Generate ideas	Present point of view	Analyze/apply leadership styles	Analyze/apply management styles	Obtain confidence of others	Develop esteem in self/others	Persuade others	Analyze/apply motivation techniques	Provide positive coaching

CREATIVE THINKING/ PROBLEM SOLVING SKILLS

Cognitive Activities																			
Collect/record information	Identify critical elements/issues	Define a problem	Identify underlying causes	Apply a problem-solving model	Analyze/synthesize information	Identify/analyze underlying assumptions	Draw conclusions	Predict results/outcomes	Identify/evaluate consequences	Identify/develop alternatives	Evaluate alternatives	Select an alternative	Devise a solution	Create a finished product	Apply intuitive/creative thinking processes	Transfer knowledge/training to new situations	Apply new technology	Develop an action plan	Evaluate results/outcomes

Job Se Selec		
Analyze personal occupational aptitudes/preferences	Investigate employment prospects of a career field/occupation	Investigate training requirements for a career field/occupation

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EMPLOYABILITY SKILLS																				SOCIAL STUDIES SKILLS																														
b Search/ election						Job Aquisition, Development														Information Analysis						Social Studies Application										Functional Social Studies														
Investigate training requirements for a career field/occupation	Investigate benefits of a career field/occupation	Compare/evaluate career options	Develop personal career path	Locate appropriate jobs	Analyze duties/requirements/benefits of specific job	Master specific job task/procedure	Fill in job-related applications	Write letter of application	Write personal resume	Interview for a job	Apply business etiquette	Practice good work habits/attitudes	Develop good personal presentation	Develop self-confidence/esteem	Develop effective leadership	Deal effectively with supervisors	Deal effectively with co-workers	Deal effectively with professional colleagues/associates	Deal effectively with customers/clients	Collect/record data	Interpret graphical information	Construct graphical information	Interpret maps/globes	Interpret statistical information	Analyze/interpret demographic information	Investigate/apply U.S. history	Investigate/apply world history	Investigate/apply U.S. geography	Investigate/apply world geography	Investigate/apply principles of government/politics	Investigate/apply principles of economics	Investigate/apply principles of ethics	Investigate/apply principles of psychology	Investigate/apply principles of sociology	Investigate/apply cross-cultural studies	Practice responsible personal economics	Prepare a personal budget	Use credit responsibly	Practice good work ethics	Participate in industrial relations	Interact with people of different races/cultures	Investigate/participate in government	Investigate/apply American legal practices	Select/use sources of information on current events	Analyze current events	Analyze consumer issues	Analyze social issues	Analyze conservation/ecology issues	Analyze social impact of science/technology	Analyze economic impact of science/technology
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